The EDISON ELECTRIC INSTITUTE BULLETIN

PUBLIC LIBRARY
1957
DETROIT

July
1957

Selling to Provide a Balanced Load Throughout the Year

Paul D. Brooks

Area Development Programs of Electric Companies

What Uses Have We for EDP?

J. P. Bromley

Conversion of 4 KV Distribution System to 13.2 KV Operation

H. A. Heim

Improved Controls for Overhead Construction Costs, Manhours

A. E. Fehlenberg

Published Monthly by Edison Electric Institute

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry
(Includes Investor-Owned Companies, Cooperatives, and Government-Owned Utilities)
April, 1956-1957

SOURCE AND DISPOSAL OF ENERGY—MONTH OF APRIL

	1957	1956	%
NET GENERATION* (Kwhrs in Thousands)			
By Fuel Burning Plants	38,621,882	35,936,910	+ 7.5
By Water Power Plants	12,046,662	11,551,667	+ 4.3
Total Generation	**50,668,504**	**47,488,577**	**+ 6.7**
Add—Net Imports Over International Boundaries	326,713	269,517	+21.2
Less—Company Use	143,237	126,604	+13.1
Less—Energy Used by Producer	1,287,935	1,065,409	+20.9
Net Energy for Distribution	**49,564,045**	**46,566,081**	**+ 6.4**
Lost and Unaccounted for	3,892,974	3,386,632	+15.0
Sales to Ultimate Customers	**45,671,071**	**43,179,449**	**+ 5.8**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of April 30th			
Residential or Domestic	46,060,088	44,755,746	+ 2.9
Rural (Distinct Rural Rates)	1,622,544	1,658,120	− 2.2
Commercial or Industrial:			
Small Light and Power	6,130,817	6,055,211	+12.0
Large Light and Power	300,416	288,294	+ 4.2
Other Customers	178,054	169,766	+ 4.9
Total Ultimate Customers	**54,291,919**	**52,927,137**	**+ 2.6**
KILOWATTHOUR SALES—During Month of April (Kwhrs in Thousands)			
Residential or Domestic	11,970,231	11,037,620	+ 8.4
Rural (Distinct Rural Rates)	921,721	954,820	− 3.5
Commercial or Industrial:			
Small Light and Power	7,323,701	6,775,905	+ 8.1
Large Light and Power	23,679,286	22,731,496	+ 4.2
Street and Highway Lighting	392,811	362,477	+ 8.4
Other Public Authorities	969,344	887,560	+ 9.2
Railways and Railroads:			
Street and Interurban Railways	197,056	203,480	− 3.2
Electrified Railroads	163,468	176,739	− 7.5
Interdepartmental	53,453	49,352	+ 8.3
Total to Ultimate Customers	**45,671,071**	**43,179,449**	**+ 5.8**
Revenue from Ultimate Customers (Thousands)	**$751,690**	**$702,697**	**+ 7.0**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 months ended April 30th, 1957			
Kilowatthours per Customer	3,034	2,838	+ 6.9
Average Annual Bill	$78.28	$74.36	+ 5.3
Revenue per Kilowatthour	2.58¢	2.62¢	− 1.5

* By courtesy of the Federal Power Commission.

THE EDISON ELECTRIC INSTITUTE BULLETIN is published monthly by the Edison Electric Institute, an association of electric light and power companies in the United States and its territorial possessions. Its affiliate members consist of members of the Canadian Electrical Association.

The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

•

Closing date for the BULLETIN is the tenth of the month preceding the month of issue.

Manuscripts and correspondence relating to the BULLETIN should be addressed to the Editor, Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

The Edison Electric Institute does not assume responsibility for, nor necessarily endorse or approve, statements made by contributors to the BULLETIN.

•

Subscription price of the BULLETIN is $2.00 per year in the United States; $3.00 per year in foreign countries.

Entered as second-class matter, August 17, 1933, at the post office at Philadelphia 2, Pa., under the act of March 3, 1879. Publication office, 56th and Chestnut Sts., Philadelphia 39, Pa. Editorial office, 420 Lexington Ave., New York 17, N. Y. Volume 25, No. 7, 1957.

The EDISON ELECTRIC INSTITUTE BULLETIN

July, 1957

Vol. 25 No. 7

Articles, Speeches, Reports

Selling to Provide a Balanced Load Throughout the Year
Paul D. Brooks 227

Area Development Programs of Electric Companies 231

What Uses Have We for EDP?
J. P. Bromley 233

Conversion of Metropolitan 4 KV Distribution System to 13.2 KV Operation
H. A. Heim 239

Let the Last Man Know
J. J. Misic 242

Improved Controls for Overhead Construction Costs and Manhours
A. E. Fehlenberg 243

A New Approach to an Old Idea 248

Prime Movers Committee Meeting
J. M. Driscoll 250

Transmission and Distribution Committee Meeting
G. H. Fiedler 251

Hydraulic Power Committee Meeting
L. B. Card 253

Electrical System & Equipment Committee Meeting
H. E. Deardorff 254

News, Notes, Miscellany

Conventions and Meetings 226

Safety Merit Awards Presented to 11 Electric Companies for 1,000,000 Accident-Free Manhours 230

Recent EEI Publication 241

Personals 255

CONVENTIONS AND MEETINGS

1957

AUGUST

19-30 University of Michigan Engineering Summer Conferences, Ann Arbor, Mich.

22 ECAP Copy Group Meeting, Sea View Country Club, Absecon, N. J.

26-30 AIEE Pacific General Meeting, Yakima, Wash.

SEPTEMBER

5- 6 Northwest Electric Light & Power Association 50th Annual Meeting, Glacier Park Hotel, Glacier National Park, Mont.

9-13 Illuminating Engineering Society National Technical Conference, Biltmore Hotel, Atlanta, Ga.

11 PIP Steering Committee, New York City

11-13 EEI Industrial Power & Heating Group, Van Curler Hotel, Schenectady, N. Y.

13 ECAP Management Group Meeting, New York, N. Y.

13-14—Maryland Utilities Association 33rd Annual Fall Conference, Cavalier Hotel, Virginia Beach, Va.

19-20 EEI-AGA Accounting Division Organization Meeting, Leamington Hotel, Minneapolis, Minn.

20-21 39th Annual Meeting, Public Utilities Association of the Virginias, Green-Brier Hotel, White Sulphur Springs, W. Va.

23-24 Missouri Valley Electric Association Accounting Conference, President Hotel, Kansas City, Mo.

23-25 EEI Industrial Relations 10th Annual Round Table Conference, Drake Hotel, Chicago. Ill.

23-25 EEI Meter & Service Committee, Hotel Nicollet, Minneapolis, Minn.

23-25 ASME Fall Meeting, Statler Hotel, Hartford, Conn.

24-25 AIEE 6th Annual Industrial Electronics Symposium, co-sponsored with Institute of Radio Engineers, Morrison Hotel, Chicago, Ill.

25 ECAP Copy Group Meeting, Detroit, Mich.

25-27 PIP 1957 Workshop Conference, Whittier Hotel, Detroit, Mich.

30-Oct. 1 EEI Electrical System and Equipment Committee, Cosmopolitan Hotel, Denver, Colo.

OCTOBER

2- 3 PEA 50th Annual Meeting, Bellevue-Stratford Hotel, Philadelphia, Pa.

1957

2- 4 Indiana Electric Association, French Lick-Sheraton Hotel, French Lick, Ind.

2- 4 Missouri Valley Electric Association Sales & Rural Conference and Home Service Workshop, Lassen Hotel, Wichita, Kan.

7- 9 EEI Prime Movers Committee, Hotel New Yorker, New York City

9-11 EEI Area Development Committee and 4th Annual Workshop, Phoenix Hotel, Lexington, Ky.

10-11 Southeastern Electric Exchange Accounting Conference, Fort Sumter Hotel, Charleston, S. C.

17-18 EEI Insurance Committee, Dearborn Inn, Dearborn, Mich.

17-18 EEI Transmission and Distribution Committee, Statler Hotel, Boston, Mass.

21-23 ASME Power Conference, Hotel Americus, Allentown, Pa.

23-25 EEI-AGA Accounting Division Taxation Accounting Committee, Williamsburg Inn, Williamsburg, Va.

28-30 NARUC Annual Convention, Peabody Hotel, Memphis, Tenn.

NOVEMBER

6- 8 EEI Accident Prevention Committee, Penn-Sheraton Hotel, Pittsburgh, Pa.

7- 8 Pacific Coast Electrical Association Hawaiian Conference, Reef Hotel, Honolulu, Hawaii

14-15 EEI Accounting Division Advisory and Executive Committees, The Cloisters, Sea Island, Ga.

19 PIP Inter-Regional Committee, (Noon to 5 p.m.) Mayflower Hotel, Washington, D. C

DECEMBER

1- 6 ASME Annual Meeting, Statler Hotel, New York, N. Y.

2- 4 EEI-AGA Accounting Division Electronics Seminar, Sheraton Cadillac Hotel, Detroit, Mich.

5- 6 EEI Industrial Relations Committee, Jointly with the New England Personnel Group, and probably the Employee Relations Committee of the Electric Council of New England, Sheraton Plaza Hotel, Boston, Mass.

9-10 EEI-AGA Accounting Division Depreciation Committee, Lord Baltimore Hotel, Baltimore, Md.

11 PIP Steering Committee, New York City

Coming—the completely rewritten and enlarged

Underground Systems Reference Book

To be published about August 1, 1957

Write for descriptive folder and price list

Edison Electric Institute

420 Lexington Ave., New York 17, N. Y.

The EDISON ELECTRIC INSTITUTE
BULLETIN

Selling to Provide a Balanced Load Throughout the Year

By Paul D. Brooks
Vice President, American Gas and Electric Service Corp.

An address before the 24th Annual Conference, Southeastern Electric Exchange, Boca Raton, Fla.

SELLING to provide a balanced load throughout the year is not a new subject for consideration by this group. Improving load factor has been the goal of many studies and programs in the past and will probably continue to be one of our more important tasks.

There is little need in pointing out the vast importance of attaining high system load factors and the penalties which are imposed by low load factors. All who have the responsibility of providing for the needs of customers at reasonable rates and at the same time earning an adequate return on the stockholders' investment are quite familiar with this problem. It is sufficient to merely point out that improving system load factor makes possible the broader sharing of the fixed charges associated with distribution, transmission and generating facilities. This can result in lower unit costs for the utility, better return on investment for our stockholders and lower electric costs for our customers.

I shall limit my discussion to balancing load through our sales efforts and I shall interpret 'balancing throughout the year' to mean attaining a balance between summer and winter peak loads and also attaining high daily load factors by filling the valleys in the load curve.

Improving annual load factor is becoming a problem to all utilities, both North and South, because air conditioning is becoming such an important load. The national summer peak load reached last August was 10 per cent above the peak of the previous summer and was above the previous winter high.

The Air Conditioning and Refrigeration Institute predicts that 37 million more horsepower of cooling load will be added between now and 1963. Daily load factor is also becoming an increasingly difficult problem because of the trend in many industrial plants toward the concentration of production into an eight-hour day, a five-day week, and fewer annual working days due to longer vacations and more holidays.

Commercial Policy and Load Factor

The commercial policy of the utility can influence the control of load factor in two general ways. One is to promote the use of those appliances and other electrical applications by all classes of our customers which will tend to balance load. The other is to design rates so that there will be economic encouragement for our customers to use additional electric service when we want them to use it. The primary objective of the commercial department of the utility must be to sell those loads and at rates which will improve the return on the utility's investment in all facilities or at least result in an adequate incremental return on the sale.

Large sales volume is not enough. Return on investment is the important thing.

But we cannot forget that we are a public utility and that we have a responsibility to our customers. Our basic policy must be to provide service to our customers for *all* of the equipment and appliances they desire and can use economically to their advantage. We must believe in and sell *electric living* as the modern way to live, *electric farming* as the profitable way to farm, *electrified industry* as the way to maximum low-cost production and *electrification of commercial establishments* for comfort, efficiency and profit. This policy of providing all of the service our customers can use for the appliances and equipment they want to use when they want to use it appears in some ways to be contrary to the primary objective of the commercial department to sell those loads which will be profitable to the utility and its owners.

This apparent conflict can be reduced to a minimum through the careful planning of the sales program and the proper designing of electric rates. I want to tell you about a few of the things that we are doing in the American Gas and Electric System. We continually make careful studies of our load factor and the shape of our load curve. This

is done on a daily, weekly and annual basis. Our weekly load factors are usually above 75 per cent, monthly load factors range from about 72 to 76 per cent and our annual load factor is just under 70 per cent. Studies of our load curve have led us to the conclusion that our load-building promotions and our rates should be designed to encourage the following electric uses:

1. High diversity applications like water heating, electric cooking and clothes drying.
2. High load factor industrial loads of all sizes.
3. Off-peak commercial and industrial loads.
4. Interruptible power for certain industrial uses.
5. Electric space heating with either the heat pump or resistance heating for all classes of our customers.

We use a dealer cooperative program embracing the "All-Electric Living" idea augmented by a direct sales program in a part of our area in promoting the high diversity domestic appliance load.

More than 1,200,000 major appliances have been installed on our system as a result of this program.

Even though low-cost natural gas is available to a great number of our customers, our electric range saturation is about 60 per cent, our electric water heater saturation is 27 per cent and we have an electric dryer saturation of more than 17 per cent.

Our residential sales program includes almost every conceivable type of mass educational approach. We use newspaper advertising urging prospects to visit dealers; cooperative newspaper supplements, radio and television programs; dealer store demonstrations planned and executed by our sales representatives and home economists; demonstrations in company auditoriums, at fairs, home shows, etc.; open house promotions for home builders; and direct mail and handout literature.

We, of course, support and participate in national programs such as HOUSEPOWER and "Live Better . . . Electrically." We encourage the installation of three-wire service entrances in homes through our policy of running our service to the meter at no cost to the customer when our standards for service capacity are met. These standards now call for a 100-ampere service.

We encourage the use of major appliances by our future customers through our school loan plan. As a result, almost 1,000 schools in our area—98 per cent of all those having home economics departments—have electric ranges installed. We have an appliance financing plan incorporating low interest rates and long terms available to all dealers. We also have a finance plan for home wiring modernization.

Our appliance repair service for major appliances is available to all customers regardless of where they purchased their equipment.

We also use inter-company and dealer sales campaigns each year based on the sale of major electric appliances which offer suitable incentives for exceeding assigned sales quotas.

Industrial Loads

High load factor industrial loads are promoted through the services of our power sales engineers and are encouraged by our rate structure. These are generally chemical, electrochemical and electrometallurgical loads. This is low realization business but our rates are designed so as to provide an adequate return on investment. These large, high load factor loads have contributed to the need for more generating capacity and have helped make it possible for us to build large new and efficient generating plants which have reduced production costs of energy delivered to all of our customers. They have also helped make our 345,000-volt transmission system possible with its resulting reduction in transmission losses. These industrial loads also make possible new employees, new homes, satellite industries, new commercial establishments and a market for farm products in our area.

We encourage off-peak commercial and industrial loads by designing our rates to give very low kwhr costs for energy used after normal use of the demand, usually 200 or 300 hours' use of the demand per month. We have had only limited success in stimulating customers to operate more at night rather than during the day. The chief reason is that any reduction in a customer's power cost is generally more than offset by labor premiums and additional supervision required for night work.

A more successful industrial practice is the sale of interruptible power at low rates to certain very large customers. We reserve the privilege of interrupting this service without notice at the time of system peak for frequency control, to meet emergencies or for other reasons which make interruptions advisable. This arrangement permits us to sell a part of the spinning reserve capacity necessary for system operation, but to recover that capacity immediately when necessary to pick up increased firm power load or meet emergencies. We limit the total amount of interruptible capacity available for sale to the size of the largest generating unit on the system. The sale of interruptible power has worked well for us and has been a factor in reducing the magnitude of peaks and improving load factor. We have contracts to sell this type of service to six different plants, all ferro-alloy manufacturers using electric furnaces, having total demands of more than 300,000 kilowatts.

The fifth type of load which we in AGE believe must be promoted if we are to have a balanced load is electric space heating and cooling, with either the heat pump or electric resistance heating and electric cooling. It is very important to the electric utility industry to go all-out for electric heating and heat pumps. If our slogan, "Live Better . . . Electrically," is to have real meaning it must mean more than using an electric range, a water heater and a few other appliances. All-electric living must include electric space heating and electric cooling. We can't be 100 per cent honest with ourselves if we talk about the all-electric home or commercial establishment if the heating or cooling is supplied with some other fuel.

We have very aggressively promoted the heat pump and resistance heating in our AGE service area.

Briefly, here is our program, how we have organized to do the job and some of the results to date:

The AGE System, which sells only electric service, operates in Virginia, West Virginia, Tennessee, Kentucky, Ohio, Indiana and Michigan, and obviously covers several temperature zones with degree days varying from approximately 3,500 to 6,500 per heating season. Our interest in the heat pump began more than 23 years ago. AGE designed and installed its

first heat pump system in one of our office buildings in 1934. During the 23-year period since that time continuous research has been conducted on equipment and applications. This included studies on heat sources, heat storage by chemicals, solar heat, equipment design and air distribution. We have worked with equipment manufacturers on the design and testing of equipment, particularly packaged units. As you know, several manufacturers have such equipment available today. A few of them have established distribution throughout the country, although much still remains to be accomplished in this respect.

Fully Electrified Home

About 12 years ago, when we were looking forward to the post-war period and making plans for developing and meeting its potential loads, we began considering the possibilities of a fully electrified home and full use of electricity by our commercial customers.

Up to that time we thought of such a home as one in which the customer used an electric range, refrigerator, electric water heater, along with other miscellaneous appliances and lighting.

Our studies made it evident to us that the domestic market was broader than this and that competition was going to be very keen. We found that if gas companies sold service for home heating, they were in a strong position to persuade customers to install gas water heating, cooking and refrigeration. We decided that in order to meet competition effectively and to capture and hold the residential market, we would have to find a way to heat homes electrically with economy to our customers and profit to ourselves.

We were deeply involved in the heat pump program, but at that time —and to some extent today—the heat pump, because of its cost was not the answer for the mass market—that is, homes costing from $10,000 to $18,000. It seemed to us that if 1,000,000 homes were to be built each year, with about 30,000 of them being built in our territory, this would be a real challenge and a very important market. We therefore undertook proper and necessary studies to determine load characteristics of heating installations, types of equipment available for satisfactory installations, insulation necessary and a sales program.

By 1953 we had the results of these studies and a survey disclosed that there were already about 1,500 homes in our service area with complete resistance heating installations. These had been sold principally by enterprising dealers with some help from us.

This survey indicated that a vast market was open to us for broadening the sale of our product and our studies convinced us that we could sell electric heating satisfactorily to our customers and profitably for us.

We therefore announced in the Dec. 28, 1953 issue of *Electrical World* a program which embraced not only the heat pump but also resistance heating and air conditioning designed to bring about the completely all-electric home.

A similar program was undertaken for our commercial and industrial customers on the basis of the existing rates of the several operating companies in the AGE System. These programs are based on cooperation with equipment manufacturers, distributors, dealers, architects and consulting engineers rather than being direct sales programs.

Our first task in embarking on our all-electric program was building the necessary organization to carry on the program. We then had to train our people to carry on the promotional, engineering and educational phases of selling electric heating and year around air conditioning. One of our biggest jobs was to work with manufacturers in establishing adequate distribution of equipment and in training dealers. We held many meetings throughout our system with architects, builders, bankers and others who would have influence in the acceptance of electric heating and heat pumps. The manufacturers gave us valuable assistance in carrying on this necessary groundwork.

Heat Pump Sales Set-up

In establishing our sales organization we experimented with several different arrangements before deciding on our present organization. We now have our heat pump activity under the supervision of our Commercial Sales Division. We have trained and maintain a staff of 24 heat pump sales specialists and application engineers at the Service Corp., general office and division office level of our companies. These specialists follow all of the heat pump leads which are developed by all of our residential, commercial and industrial sales people. They follow each prospective job from the technical, engineering and sales standpoint. They also work with builders, architects, distributors and dealers on details necessary to a successful heat pump sales program.

Five-Point Service Available

We make available to all of our customers or their architects and consulting engineers a heating and heat pump engineering service. This service includes:

1. Determining the heating and cooling loads.
2. Selection of the equipment.
3. Preparation of all drawings and specifications.
4. Obtaining competitive bids.
5. Furnishing a supervising engineer to make certain that the system is properly installed.

This service is furnished at no cost to the customer and it has been an important factor in increasing the acceptance of heat pumps, particularly the larger installations in our area. If the consulting engineer or architect prefers to do the design work himself, our specialists are available for consultation. In several instances our engineering service was used on an architect's or engineer's first job, after which we were asked only for suggestions on succeeding jobs.

Our organization for selling resistance heating is somewhat different from our heat pump sales organization. Here the responsibility for electric home heating is under the residential sales division. Electric space heating sales to our commercial and industrial customers are handled by our commercial sales representatives and our industrial sales engineers.

Although we have a few home heating specialists, our builder sales representatives follow most of the home heating work. These salespeople who work with builders are best able to follow electric heating in new homes. Sales to older homes and to new homes built to the owners' specifications are generally followed by salespeople who normally call on residential customers, dealer representatives and rural sales representatives.

One very important phase of the necessary educational work is the training of all utility employees. We found that many employees had the mistaken idea that electric heating or heat pumps were fine, provided the customer was willing to pay a premium for this kind of service. Some of our customers were told by our employees that the cost of electric heating would "break them up."

We conducted employee information meetings at every employee level with, we believe, very good success. Today almost 50 of our employees, including our president, Philip Sporn, have purchased heat pumps for their homes and several hundred of them are heating their homes electrically. These employees are our best salesmen for the all-electric home.

Promotional Program

So much for organization — what about our promotional program?

Actually it's probably not much different from yours if you are promoting this type of electric service.

We use all forms of advertising, including newspapers, radio, television, direct-mail, open-house parties and special brochures on specific installations. Speaking of television, we have used a number of one-minute spots based on the Nema Resistance Heating film strip. We have presented illustrated slide talks to bankers, builders, engineering and architectural societies and all types of public groups.

Only recently we conducted a very successful two-day seminar devoted to the heat pump and resistance heating at Roanoke, Va., for the architects and consulting engineers located in our service area. We are confident that educational meetings of this type will do much to gain acceptance for electric heating. Our people have also written hundreds of articles for architectural, engineering and technical publications. Reprints of these articles have been widely disseminated.

Employee Assistance Plans

We have special employee assistance plans including financing the purchase of equipment for their own homes. We set yearly sales quotas and, more importantly, we have incentives for our sales and supervisory people for sales accomplishments. We, of course, use displays in our own offices and work with dealers in connection with their displays at public affairs. We have a home heating budget billing plan to help customers spread their heating costs evenly throughout the year.

Finally, heat pumps have been installed in 42 company buildings, and all new or remodeled buildings in the future will include either heat pumps or resistance heating.

Our progress in selling the electric heating market may appear to be slow but we are making steady progress. As each day passes we are more confident than ever of the future of year around electric heating and cooling equipment for the home, for commercial establishments and for industry.

At the end of 1956 our customers had in use or were installing 364 heat pumps in residences and 226 heat pump installations in commercial and industrial establishments. These figures do not include window or small room type heat pumps. We are now working on many additional prospective heat pump installations, one requiring 1,500 hp for an office building. More than 7,000 of our customers were heating their homes with electric resistance heating. These are complete heating installations as we have no records on the thousands of auxiliary electric space heating installations.

Safety Merit Awards Are Presented to 11 Electric Companies for 1,000,000 Accident-Free Manhours

Eleven EEI Safety Merit Awards were presented to nine member companies bteween May 1 and June 15, 1957, for completing 1,000,000 or more manhours of work without a disabling accident.

Alabama Power Co.'s award is the eighteenth million-manhour certificate to be awarded the Electric Operations group, which includes all employees other than those engaged in coal mining operations.

The company has also received a 4,000,000 manhour certificate for safety.

BG&E Gets Fourth

The awards to Baltimore Gas and Electric Co. bring to four the number of one million manhour certificates held by their Power Production Stations personnel who have also received a 3,000,000 manhour award. The award to Consolidated Edison Co. of New York, Inc. continues the outstanding achievements of its Station Construction & Shops personnel who, operating in a hazardous field, have earned several such certificates over the years. The Entire Company award to Texas Power & Light Co. is the third million-manhour certificate to be earned by the joint efforts of all of their employees since a 5,000,000 manhour certificate was awarded them in the summer of 1954.

The companies which received certificates during this period are:

Alabama Power Co.
Electric Operations ... 1,794,315

Baltimore Gas and Electric Co.
Electric Distribution Department, Underground Lines Division 1,004,581
Power Production Stations 1,004,223

Consolidated Edison Co. of New York, Inc
Station Construction & Shops, Mechanical Construction Bureau. 1,000,000

Gulf States Utilities Co.
Entire Company 1,000,000

New Orleans Public Service Inc.
Power Division, Electric Department 1,000,228

Ohio Edison Co.
Massillon Division 1,000,000

Oklahoma Gas and Electric Co.
Northern Division 1,000,000

Pacific Power & Light Co.
Entire Company 1,012,480

Texas Power & Light Co.
Entire Company 1,311,375
Transmission Division, Operating Dept. . . . 1,786,099

Area Development Programs of Electric Companies

Survey Indicates Varied Activities

THE vast scope of area development programs being conducted by electric utilities is indicated in a recent EEI Area Development Committee survey. The survey revealed that 49 of the 50 companies which responded to the questionnaire of the Committee were engaged in industrial development activities; 41 had urban community development programs and 39 rural improvement programs. In addition, 21 tourist development activities were reported.

The survey, developed by a Community Development Subcommittee under the chairmanship of H. W. Carloss of Kentucky Utilities Co., has two primary objectives: 1) to collect and summarize information about community development activities of electric companies and to make this information available to interested electric organizations, and 2) the report will serve as a guide for the Area Development Committee as it develops future programs and materials in community development.

Behind the Programs

Most of the reporting companies gave as their objectives for inaugurating these programs a desire to develop the area economy, promote industrial growth and to improve public relations. A large percentage of the utilities indicated that the importance of the programs to the companies themselves was in increased revenues through more industry and improved economy with higher standards of living.

Among the factors which create the need for development activities, the following were the most-named: sudden population shifts, exodus of industry, sudden area growth, and the need for more employment among the area youth. In areas where population growth outstripped that of industry, the utilities sought new industry to help balance tax rates.

These programs, covering different aspects of area improvement, are conducted in cooperation with a variety of local and national organizations. Town, city and state agencies predominate among the governmental agencies with which electric companies cooperate in development work.

Indirect rather than direct approaches to area problems usually are taken by the companies. Their most important step is to influence the community to initiate development programs. This is being achieved by bringing to the attention of community leaders area problems, suggesting solutions and serving on committees to bring about these solutions.

Cooperative organizations mentioned by companies in connection with area development included chambers of commerce, town councils, service clubs, other utilities, resort associations, manufacturers, realtors, convention bureaus, farm organizations, univer-

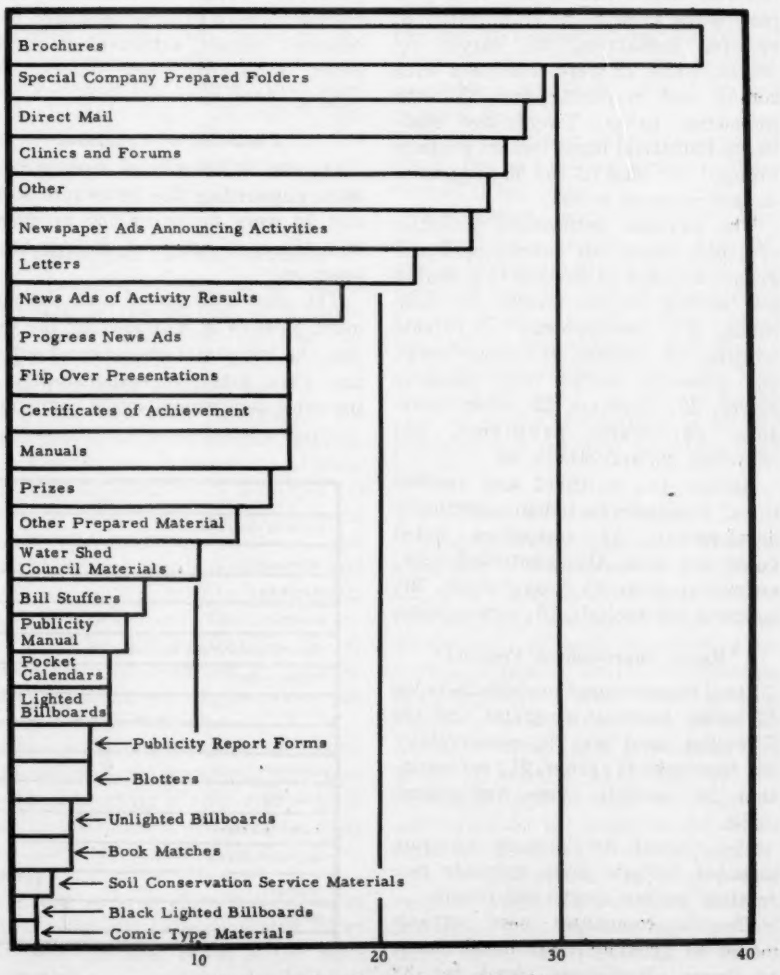


Figure 1—Promotional Materials Used by Electric Utilities in Community Development Programs

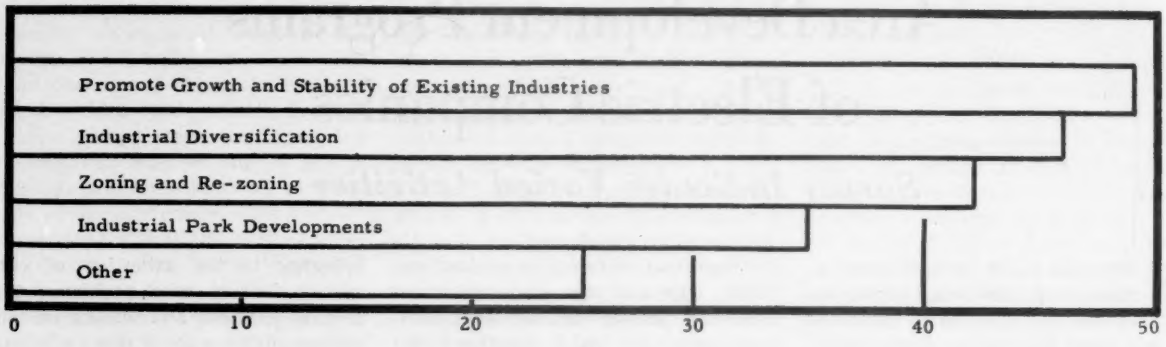


Figure 2—Industrial Development for Community Improvement

sities, industrial development corporations, home builders, travel, state and Federal agencies, banks and other organizations.

Of the 49 utilities engaged in industrial improvement, all were promoting the growth and stabilization of existing industries, the survey revealed, while 42 were concerned with zoning and re-zoning and 35 with industrial parks. Twenty-five additional industrial improvement projects brought the total of the 50 companies in this category to 197.

The physical betterment activities of urban community development programs included 42 devoted to planning and zoning; better stores, 32; hospitals, 29; development of private housing, 27; schools, 27; playgrounds, 26; clean-up drives, 26; paint-up drives, 25; libraries, 25; slum clearance, 22; traffic problems, 22; churches, 20, and others, 18.

Among the cultural and recreational programs in urban community development, 32 companies listed youth activities. Also mentioned were: swimming pools, 21; playgrounds, 20; concerts and recitals, 19; others, nine.

Rural Improvement Projects

Rural improvement projects included 32 better farming programs and the following: land use, 29; conservation, 26; livestock, 24; crops, 21; reforestation, 14; wildlife, three, and others, eight.

The tourist development program included historic sites, summer recreation, winter sports and others.

Electric companies used various media to promote their development programs. Brochures, used by 38 utilities, was the most popular medium. Special folders were used by 29 companies and clinics or forums by 27. Newspaper ads were placed by 25 utilities to announce activities, while 15 reported progress of the activities in ads, and 18 reported the results. Other methods of promoting programs were: bill stuffers, pocket calendars, blotters, manuals, book matches, prizes, achievement certificates, billboards, and letters, and others.

Financing of Programs

Of the 50 companies surveyed, 22 were supporting the programs solely and 24 were financing the programs with the cooperation of various other agencies.

The close alliance of area development to sales is indicated by the fact that the industrial development activities were listed as responsibility of the sales department by 28 companies and as an autonomous department by 14 companies. The ratio was even less for other development phases: urban —22 under sales and two autonomous; rural—25 under sales and five autonomous; tourist—nine under sales and eight which were operating as autonomous sections:

Utilities reported as many as 16 employees working full-time on one or more phases of the development programs with as many as 350 employees in part-time support. Full-time employees were engaged primarily in industrial development. Thirty-six companies had from one to six full-time personnel engaged in this phase of the program, while 21 companies reported full-time employees concerned with rural development, 15 with urban community and six with tourist development.

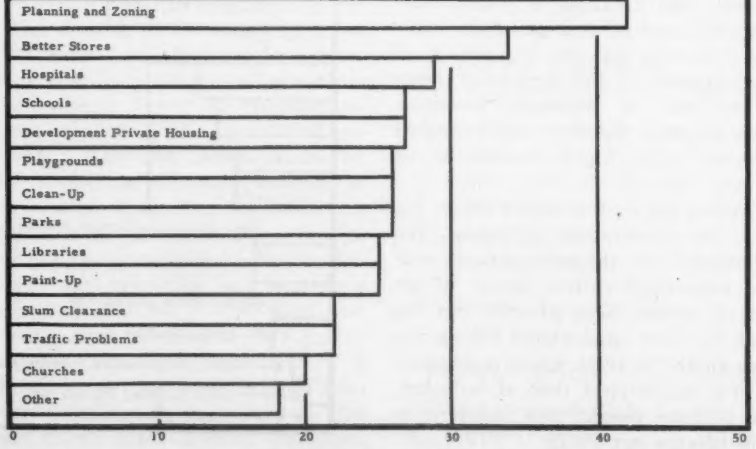


Figure 3—Urban Community Development (Physical Betterment Programs)

What Uses Have We for EDP?

By J. P. Bromley
Assistant Controller, Consumers Power Co.

An address before the 1957 National Conference of Electric and Gas Utility Accountants, Washington, D. C., April 10, 1957

I WOULD like to take you with me on a trip of exploration. We are going to be traveling in a rather strange land, which has but recently been discovered. The name of that land is Edpa (Electronic Data Processing Applications). Only an occasional frontier settlement has been planted, and in many cases these settlements are struggling to exist. Beyond them lies a great hinterland of unexplored virgin country. The route we take into Edpa is probably far from the best, but as least we will see some pretty scenery, and we may find a few places where at some time in the not too distant future, flourishing settlements will spring up.

Before we enter this strange land of Edpa, let us consider the situation which confronts us.

At no time within the history of man has there been as great an impending change in the methods of processing of clerical work as there is today. The principal reason for this impending office revolution is the development of electronic data processing. It is generally agreed that this development has just begun and that computing machines are here to stay. They are fast becoming an accepted and proven method of processing clerical and computing routines which are either large-scale and/or complicated.

Wide Use Predicted

To date, the machines have only been applied to a relatively few areas of clerical activity. The conclusion is inevitable, however, that their use will become much more widespread. The factors which lead to this conclusion are as follows:

1. As machine development progresses, better design of the machines will (a) make them more adapted to the work to be done and (b) reduce the cost of the machines per unit of work processed.
2. As industry becomes better acquainted with the machines and with the techniques for applying them to clerical work, better methods of such application will develop.
3. With the ever increasing clerical labor costs, the selection of the more economical method of processing work will become increasingly more in favor of the machine as against manual methods.

If we accept these conclusions, then it behooves us to look into the future and to start conditioning our thinking toward the time when each of us will be faced with the fact that a computer may be the answer for our data processing needs. Five years ago, even those operations presently being processed electronically, were in the visionary stage. In fact, today's computers themselves were at that time in a visionary stage. Therefore, can we assume otherwise than that five years from today the computers which right now seem visionary to us may be actuality?

Thought and Planning Required

A moment's reflection is all that is necessary to realize that in a large-scale development such as this, *we cannot just decide to do something today and begin to apply our decision tomorrow.* On the contrary, the development of a computer application requires much thought and planning. Management must condition its thinking to the new concept; present procedures must be surveyed and evaluated; and original concepts and new ideas with regard to applications must be worked out. Research is essential if we are to progress in the development of electronic data processing applications, if we are going to make Edpa flourish.

The purpose of this discussion is to review those operations necessary to the conducting of the utility business in the light of whether they may be susceptible to electronic data processing.

This is an area of consideration on which relatively little concerted effort has been expended. Most of the work done so far on computer development has been in connection with the hardware; and in connection with a few specific applications involving scientific studies, payroll, customer billing and storeroom records and requirements. These applications are only a fraction of the total clerical effort expended in our business.

I do not propose to discuss these "bread and butter" jobs, but rather to consider other opportunities in the utility business for the use of computers. It is important that we consider these "other" applications either because (1) they are justified as being applicable in their own right or because (2) for most companies the use of computers on "bread and butter" jobs still leaves available computer time which should be put to good use.

So come along into the land of Edpa. Let us consider what are these "other" jobs.

We should keep in mind that we are pioneering, that we are surveying virgin territory. Some of this territory will be rich in possibilities for computer application. Other areas may not be so promising. But in any case, we are going to have to "look the ground over," we are going to have to do our prospecting, if we are going to find the gold in "them thar hills."

Edpa Has Many Regions

Geographically, Edpa is divided into a number of regions where computers may play a part. Each of these regions may include a number of applications or specific jobs, each job drawing on a common fund of source information. Accordingly, in a sense we are talking about *integrated* data processing as well as *electronic* data processing. The areas of activity in which we are interested include (but certainly are not restricted to) budgets, personnel, material, revenues, property, reports, fuel fleet operations, audits, corporate records, statistical studies, finance, scientific and engineering applications, operations research and taxes.

Let's take a quick look at each of these and consider the possibility of electronic data processing. Our look

of necessity will be quick, because there is too much to consider to spend much time on any one item.

Budgeting and Budgetary Control

All companies prepare budgets. These include construction budgets, operating budgets and cash budgets. In each case the budgets require a large amount of paper work. There is the job of gathering of information, after which the information must be evaluated and related to forecasts for a future period.

In each case after a budget has been formulated and adopted, a further element of cost control involves relation of actual figures with budget figures. What is needed is a method whereby forecasts and raw data as to units and unit cost can be fed into a computer system.

From this basic information, the computer would develop the budget both in detail and in summary form. Such a compilation would provide budget data more accurately and more promptly than is possible by other methods. It would permit management to change the basic factors, as may seem desirable, recompute the budget and get a full appreciation of the effect of such changes on the budget.

For example, a change in the forecast of future business conditions could be substituted into the previously prepared budget to develop an alternative budget. In like manner, as time passes and conditions change, budget revisions would be relatively easy to make. For example, a change in labor rates could be applied to the basic data of man-hours by occupational groups and by accounts so as to provide a complete new expense budget.

In evaluating the appropriateness of a proposed budget, machine comparisons against previously established norms would give management the assurance that the proposed budget was realistic and would point out those budget items which differed from the established norms to such an extent that explanation should be required.

Because the completed budget would be in machine language, it would be an easy matter to relate it to actual expenditures. This possibility will be discussed further, later in this discussion when other applications are being considered.

One company within the utility industry is presently processing its payrolls through the use of a large-scale computer. For the rest of us, however, the field of personnel and payroll records on a computer is largely unexplored, in spite of the fact that for companies outside the utility industry payroll had been a somewhat standard application for data processing machines.

Perhaps the approach to this matter should be on the basis of a comprehensive application which would establish for each employee one master record to include all the information with regard to his employment. From this master record would come the basic information for use in payroll processing. From it also would be developed various personnel records and statistics. This would include records of work performance, test scores and the like, together with a complete historical record of the employment.

In addition to payroll preparation data, processing of these records would include pension fund operations, maintenance of employee accounts on payroll deductions, group insurance records, and records on other fringes and activities.

These records would also be used for making studies with regard to personnel problems such as those involved in labor union negotiations, training and recruiting costs, extent, significance and reasons for labor turn-over, cost of fringe benefits.

Purchasing and Stores

Some utilities have made studies with regard to the use of computers in accounting for and controlling materials and supplies. Generally speaking, such studies are concerned with the maintenance of the accounting records and the providing of information for material control. What may be needed to make this application really worth while is to enlarge its scope and integrate it into the purchasing activity which preceeds it, and into the accounts payable activity which follows.

One thing is sure, the initiation of a purchase requisition causes a chain of events which continues until the bills are paid and the material purchased has been used; and in many cases this use in itself culminates in a request for repurchase starting the whole cycle over again.

Utilities have always had difficulty in their materials and supplies operations to establish automatic reorder points. One important reason for that difficulty is the fact that much of the materials is used in construction, where its need is dependent upon the construction program ahead.

Perhaps with the electronic computers we can do a better job of anticipating our construction requirements and thereby do a more scientific job of automatic determination of reorder points.

If so, it should be possible to initiate the purchase order within the computer. This would include automatically determining the desired quantity, from which vendors the material is available, what the lead time is and any other special data necessary to place the order.

After a purchase order has been placed, a record of it would be continued in the system so that from that point until receipt of the material any print-outs with regard to the item will include both the material on hand and that on order. When the material is received, a new chain of events is started. The computer would bring the balance on hand up to date, eliminate the on-order situation, establish a record which would be a basis for further machine operations in connection with invoice processing and for vouchering.

These procedures have been sketched only as they may apply to materials and supplies items. However, a logical extension would be to apply them to the whole purchasing and accounts payable activity so as to provide an integrated operation for this entire phase of the business.

Invoices would be machine-checked against orders and receipts, extensions would be verified, the item would be processed for payment and electronically filed for combining with future invoices of the same vendor. Upon vouchering and payment, the data so established would already be in the machine system for inclusion in the books of account.

Revenue Analyses

Assuming that customers' accounting is being done through the use of a computer, other uses for the basic information, so developed in computer language, need to be explored. Our sales departments generally have operated with such a relatively small amount of statistical information available to them, that there may well be a complete lack of appreciation of

what information *could* be developed and the uses that could be made of it.

Certainly, customers' accounting provides the raw material for many sales analyses and revenue statistics, some of which have heretofore been impractical because of the compilation work involved on a manual, or even on a punched card basis. With the advent of computers, many of these items may become practical. This includes studies with regard to customer inquiries, opinions, statistics and questionnaires. It also includes development of long-term trends for different types of customers, for geographical areas and in evaluating the results of different promotional activities.

From the customer accounting records will also come the raw materials for rate studies, for better understanding of revenues as related to costs to serve particular types of customers. Rate studies are an important aspect of our business. They deserve our best attention. This may well be one of our gold mines.

Property Records

There are a number of applications in connection with property record accounting in which an electronic data processing system would be of material aid both in the keeping of the records and in the obtaining of information which could be derived from such records. Again, we should consider a system which will pick up the basic information at the earliest possible moment. This occurs with the development of the engineering estimate of the cost of a prospective plant addition. As the engineer determines the various elements of cost which are involved in the addition, these elements would be assembled within the data processing system, so that as the construction budget is adopted, there is in the computer system a basis for measurement of future construction costs.

This information would first be used in connection with construction schedules to initiate and control the ordering of equipment and materials. Proper scheduling would insure that (a) the required items and quantities would be available on the job site when needed, and (b) future needs would be known, thereby making it possible for the purchasing department to buy in quantity at times when the market offered the best prices. Likewise, the engineering estimate could be used to develop manpower requirements, particularly on those jobs where the utility plans to do its own construction work.

As the construction progressed, job costs could be measured against the estimate, the detail of such measurement depending only upon the detail of the estimate and the correlation possible between the actual expenditures and the items in the estimate. A properly designed system should provide these cost comparisons promptly, thereby permitting a new concept of the degree of control possible in connection with construction work.

At the completion of the construction work, the computer system would have available all the elements necessary to unitize the property so constructed and to establish the desired continuing property record. If this record is contained on magnetic tape, it provides an opportunity for efficient updating of the record. As additional property is constructed at a location, the tapes can be revised to include the new items. Likewise, as property is retired, the units so retired can be deleted.

Such revised records can be summarized at tape speeds so that at all times the continuing property record will be proven to be in balance with controls. This type of record would greatly facilitate analyses of property whenever such analyses might be needed whether they be in connection with rates, depreciation, taxes, insurance, management purposes or public requirements.

In connection with depreciation, such studies usually require involved calculations based on survivor curves, probability theories, leased square calculations or what have you. Because of the importance of depreciation, dollar-wise, accounting-wise, rate-wise, and tax-wise, research into better methods of recognizing depreciation is constantly going on. It has long been realized that a computer is a valuable aid in making mathematical calculations necessary in such research. It should, therefore, be an even more valuable aid if the basic data on which it operates is, as a matter of system design, continuously available within the computer system.

In many cases tax depreciation requires separate records and calculations from those required for book depreciation. A properly designed system of property records will permit the identification of items for income tax depreciation so that they can be operated on as needed for that purpose. As a result thereof, the work involved in preparation of the income tax return can be materially speeded up and the accuracy of the data so developed can be assured, since it is derived directly from the original records.

In connection with real and personal property taxes, some utilities deal with taxation authorities only at the state level. In other cases the assessments and payments of taxes are conducted at the level of local governmental units (city, township, county, etc). In these latter cases, having the property record available in computer language, would make possible a much better review and evaluation of the assessments and tax bills. Under present methods, this job can be a staggering one for any utility operating in a number of political subdivisions. The volume of such items very often permits only a cursory review if done on a manual basis. A machine system should permit such a review on a formula basis, with a print-out of those items which do not come within the formula.

Reports

There are three basic ways in which report preparation can be improved through the use of an electronic system. These are the timing of the report, the evaluation of the information contained therein, and the extent of detailed information presented.

First, with regard to the timing: traditionally, by the very nature of report preparation, there is a substantial time lag between the period of activity covered by the report and the issuance of that report. Very often the use of the report is handicapped because of this time lag. In fact, in many cases information which would be of value if it were immediately available is not used because it is stale by the time it becomes available.

To the extent that an electronic system can employ random access in the accumulation of data, the storage units can be maintained up to date at all times and a print-out of the accumulated data can be made in a very short time. Even without random access any electronic system should speed up the accumulation of data for report purposes.

Another aspect in connection with

the timing of reports is that it should be possible to schedule their frequency more nearly in direct relationship to the needs of those who will be using the reports.

Second, with regard to evaluation of information contained in the reports: the ability of a computer to make comparisons and logical decisions makes practical an entirely new approach to report presentation. No longer need it be customary that the report present only the facts as to accumulated dollars or quantities. Rather, with a computer system, it is possible to relate such quantities or dollars one to the other, to recognize significant differences, and to give to management information identified as to its significance rather than just as to its absolute quantity or value.

Third, with regard to volume of detail: the amount of detail being reported out of the system generally can be tailored specifically to the purpose for which the report is being prepared. For those items which are necessary for record purposes, a complete print-out at high speed would be programmed. For those items, which are useful to management or to departmental operation only to the extent that they vary from established norms, a selected print-out would be made. This is in line with the theory of management by exception, the basis of which is reporting by exception. In this manner, not only can the volume of reports be reduced, but at the same time attention can be focused only on those criteria which deserve management's attention.

With an increasing number of companies going on the responsibility accounting basis, the form of report presentation together with the timing of such reports takes on new significance.

Responsibility accounting systems generally have characteristics which give them special applicability to an electronic data processing system. Usually some comparison with budget is involved. If the budget has been integrated into the system, the basis for such comparison is readily available.

Responsibility accounting systems are more effective where the reports can be prepared promptly. This is more easily accomplished with an electronic system. Responsibility reports include comparisons and ratios. The operations necessary to develop this data are easily accomplished with a computer. A responsibility accounting system is premised on more attention to the cost details and a greater amount of breakdown and analyses of such details. Again, the computer is an ideal tool for the purpose.

Fuel Records

A major element of cost in electric company operations where generation is by means of coal-burning plants, is the cost of coal. Accordingly, the records in connection with such cost are worthy of the best treatment possible. With an electronic system, fuel records might be originated at the time the coal leaves the mines, and continued to keep track of the coal as it enters the stock pile, and as it is consumed. Such a system should provide the following:

1. A basis for expediting coal shipments.
2. The information necessary for proper pricing of coal in stock.
3. Computations to the extent needed to assure efficiency of use with regard to relative values in btu's per ton.
4. A tool whereby at the time of inventory raw survey data could be reduced accurately and spedily to quantities on hand.
5. A running record of plate consumption as coal is delivered to the bunkers. These factors are generally being kept manually for any system presently in use, but a computer system might well provide a much better integration of the detail as well as faster or more frequent reporting of needed information.

Fleet Operations

Because of the nature of their operations, utility companies must maintain large fleets of motor vehicles. As a result thereof, many different records are needed. These include the property record itself, a record of performance for each of the various units of the fleet, and the record necessary in order to properly distribute the fleet costs over the accounts covering the work on which the vehicles were used. With regard to the property records, we have previously discussed such records, and the record of vehicles would fit into whatever general patterns were adopted.

With regard to the records on operational costs, there is at present considerable difference from one company to the next, as to the extent to which detailed records of performance and cost for each vehicle or for groups of vehicles are maintained.

For those companies which do not keep a detailed record for each vehicle, the decision not to do so probably results from the belief that the volume of detail involved in relation to the benefits obtained therefrom is such as to make the record unwarranted. On the other hand, those companies which do keep their records in considerable detail feel otherwise.

If with electronic data processing the cost per record can be sufficiently reduced, it is logical to assume that companies generally will keep these performance records in greater detail. This may be particularly the case if we consider that in addition to keeping the records, the computer could evaluate actual operational costs as against costs under alternatives such as a change in policy with regard to preventive maintenance, or with regard to the age or mileage at which a vehicle would be replaced, rented or leased.

The costs of operation could be weighed against purchase of new equipment either on the basis of individual fleet units or by establishing standards in relation to the type of vehicle or in relation to the work assignments for the vehicle.

With regard to distribution of vehicle cost to the various accounts, one of two methods is presently in general use within the industry.

Either the distribution of such cost is primarily on a mileage basis or it is primarily on the basis of hours of use. In either case the vehicles are probably segregated into a number of classes, with a different rate of charge being used for each class. The use of a computer should improve the flexibility as to what methods of cost distribution are feasible.

Composite methods of determining what part of the total cost of the vehicle is assignable to an account could be developed. It might be possible to give recognition to certain variables such as waiting time as against running time, use in light work as against heavy work, consideration of age of vehicles, etc.

All of this would be with the idea of overcoming the inherent limitations which each of us, no doubt, can recognize as being characteristic of

the particular system which is in effect in our own company.

Audit

As more accounting records are converted to electronic systems, the techniques of audit will have to be changed so as to be responsive to the methods by which the records are kept. This is a situation which has received general recognition within the accounting fraternity.

However, except for those who are primarily concerned, the full impact of the situation may not be so readily apparent. Whether we are talking about independent auditors, internal auditors, commission auditors, tax auditors or any other group, they must have a new understanding if they are going to audit records prepared under electronic processes.

To make their work easier and the results better, there should also be a development of machine procedures and techniques which are designed specifically for the purpose of doing auditing, and which are under the control of the auditor. Accordingly, these specially designed procedures in themselves become an application; and one which will have to be specifically designed for the type of material being audited and for the electronic system in use.

Stockholders' Records

For companies with a large number of stockholders, the volume of capital stock transactions and records is sufficient so that this phase of the record-keeping work appears to be a natural one for electronic accounting machines.

One company in the industry has so decided, and this application may soon become an accepted one for computers. The normal operations of stock transfer, dividends, proxies and analysis of holdings occur with sufficient frequency so that there is a possibility of real savings.

In the case of marketing additional securities to the public, there is always an aggravated peaking of work load during the subscription period and a resultant increase in overtime work, confusion and possibility of error. This extra work if done on a computer might be done with dispatch and with results which would be very gratifying.

Board of Directors' Minutes

Over a period of years the topics covered and actions taken at board meetings cover many activities. To properly index these minutes requires an elaborate cross index and much record keeping. While this may not be a major job for a computer, it might well be an efficient one; and the results obtainable might be much improved over those obtained by manual methods.

Statistics

Inherent in any business is the compilation of statistical data. The utility business is no exception.

Statistics are compiled with regard to all phases of the business. Some of these statistics will flow naturally from the applications which are on the computer in their own right. In other cases, particularly in the case of special statistical studies and analyses, it may be desirable to enter data into the electronic system specifically for the purpose of obtaining such statistics.

Statistical compilations include those needed for management purposes and those needed for governmental requirements. A computer can be useful in work occasioned by sales and advertising analyses, in forecasting, in load studies and in other similar applications. Operating statistics, when compiled in an electronic system, are readily available for use in cost comparison.

Finance

All of us are impressed with the large amounts of capital which are necessary to provide adequate electric or gas service. In our expanding economy, utility companies must raise new capital at frequent intervals. Accordingly, every means at our disposal should be used to guide us in making intelligent decisions on financial operations.

It would be a valuable aid to have computer procedures which could scientifically evaluate when to sell securities and what type of securities to sell, i.e., whether to sell preferred stock or common stock, mortgage bonds or debentures, or whether to engage in short-term borrowing from banks.

The variables involved in these studies include interest or dividend rates for one type of security as against another, both long-range and immediate forecasts of money needs and money markets and the factors involved in refunding or other means of refinancing.

A mathematical model, constructed to take into account these variables, could be programmed so that answers would be obtainable for any assumptions of the values to be given to each of the variables. These financial studies could be related to long-term forecasts of anticipated operations to determine that the anticipated increased income justifies the proposed financing in order to provide capital for investment in fixed property.

Engineering

It has become generally recognized that electronic computers have a widespread application in the solution of engineering problems. This is true even in the case of computers which are acquired primarily for use as business machines in data processing rather than for scientific or engineering purposes. Accordingly, most companies which have acquired an electronic computer (or which contemplate such acquisition) plan to develop engineering applications.

As this development progresses, it may become increasingly evident that we are just scratching the surface of the total amount of such work which can be done on computers.

We generally appreciate that the role of electronic processing in business is to take the drudgery out of routine clerical work. In somewhat the same way, computers can take the drudgery out of engineering work by performing those extended mathematical calculations which so frequently are present in engineering work. They can do the computations much faster and much more accurately and precisely. They permit more complete answers, instead of merely "horseback" estimates.

For most utility companies, the ability of present-day large-scale computers (not to mention those to be designed in the future) to process enormous volumes of work means that to realize the full use of such computers will require that the same computer be used on other work in addition to the accounting and business jobs. Accordingly, the use of the computer on engineering and management problems should be considered when making a feasibility study. In some companies, the engineering work may be sufficient to justify a computer for such work alone.

Operations Research

During the past few years there has developed a new approach to

scientific management. Generally, this is referred to by the term "Operations Research."

Operations research problems are solved through the development of mathematical models. These models may take the form of simultaneous linear equations or they may involve other forms of mathematical notation, but usually the efficient solution of them requires an electronic computer. In fact, the development of operations research as a technique for solving management problems has grown up in the past decade simultaneously with the use of computing machinery.

Perhaps it might be said that both arts (or sciences, if you prefer) are in the same state of development. We can expect a much greater use of both in the future than has been the case in the past.

Examples of operations research techniques in the solution of utility problems might include the following:

1. *Location of Facilities.* As utilities grow and as operating conditions change, new facilities must be built to take care of the changed system requirements. Whether these new facilities involve determining the location and capacity of generating plants, substations, gas pressure stations, electric or gas transmission lines, service centers or other headquarters buildings, in any case, they present a type of problem which can be solved using operations research techniques with computers.
2. *System Operation.* Better forecasting and better knowledge of system requirements for gas or electricity is dependent upon a number of factors. These forecasts and requirements are generally predictable when the factors are given proper weighting. The factors include weather conditions, expected hours of daylight and darkness, day of week in connection with load characteristics, industrial activity, effect of holiday, etc. Such factors entered into a computer and correlated with the variable factors involved in efficient system operation, such as available capacities at varying costs per unit and by location may permit the determination with greater scientific accuracy of the optimum arrangement for system operation.
3. *Efficient Use of Water Power.* For companies with a number of hydro plants, a very interesting computer application can be worked out in the determination of the best water levels to be maintained in reservoirs in order to make the most efficient use of river flow. The aim is, of course, to use all available water without spilling any, to have it available for use at peak periods so as to reduce the demands on other generation equipment and to use it with the maximum head so as to obtain the full power potential. This becomes a nice problem for a computer when it is considered in terms of variable flow in a river system and in terms of when the peak demands occur in relation to flowage volumes and the storage capacities of the reservoirs.
4. *Management Policies.* Much can be done to aid management in the determination of proper practices with regard to such items as degree of staffing to take care of customer service calls; extent of telephone facilities in relation to frequency and importance of use; policies with regard to maintenance of equipment, particularly preventive maintenance; studies to determine the advisability of acquiring a new property; and a continuing investigation into the occurrence probabilities of events which can affect the company favorably or adversely. Forewarned with such knowledge management is in a better position to determine whether calculated risks should be taken. And what management decision does not involve a calculated risk?

Conclusions

And so we have surveyed the land of Edpa, Electronic Data Processing Applications.

If this discussion has done nothing else, I hope it outlined something of the possibilities for the future. There undoubtedly are other areas which hold possibilities for electronic data processing.

However, in no case can a brief consideration such as this be construed to be either an endorsement for or a rejection of an application. Rather, this discussion should be regarded as an attempt to make an organized presentation out of the "pipe dreams" in which we all indulge.

Actually, the worthwhileness of an application can only be determined by a very extensive investigation and evaluation in terms of the particular company and situation involved. If this is properly done, the idea will stand or fall as it may be justified in terms of economy of operation or better results.

More often than not the situation in which we find ourselves is that those who have the knowledge to apply the new techniques and to evaluate applications for computers, are not acquainted sufficiently with the operations which might be adapted to computers.

Furthermore, these persons with computer knowledge may not have the authority to make decisions and to take actions which very often must cut across departmental lines in order to take advantage of the full potential of computers.

Management's Responsibility

Stated contrariwise, those persons in management, who have the authority to take action, frequently have either not seen the necessity to do so or have been unable to take the time to become sufficiently acquainted with computers, and to make those investigations and tests which would enable them to decide intelligently with regard to their use.

As the use of computers becomes more prevalent and as the experiences of various companies on different applications become available, this situation, it is expected, will begin to resolve itself.

As more efficient computers are built and as improved methods of using them are developed, the evaluation of their use will require continuing revision. With this in mind, it behooves all of us to remain open-minded, to observe developments, to keep it very prominent in our thinking that sooner or later our own company is going to be faced with a decision.

We cannot avoid the decision by neglecting it.

Merely not deciding to go ahead with something is, in fact, deciding *not* to go ahead.

For most of us the major decisions are going to be within the next few years. Is it not the part of wisdom to be sure that we keep abreast of developments in electronic data processing?

The stakes are high; can we afford to do otherwise?

Conversion of Metropolitan 4 KV Distribution System to 13.2 KV Operation

By H. A. Heim

Superintendent, Overhead Department, Kansas City (Mo.) Power & Light Co.

Presented before the Transmission and Distribution Committee Meeting of Edison Electric Institute. Kansas City, Mo., May 2

At the close of World War II, Kansas City Power & Light Co. customers in the metropolitan area of Kansas City were served principally by a 2,400/4,160 volt distribution system within the city and by a 7,200/12,500-volt system in the suburban areas. The 2,400/4,160 volt, or so-called 4 kv system consisted basically of indoor-type substations fed from 13.2 kv underground cables from our power house busses. The #1/0 w.p. copper feeders from these substations were regulated and supplied the overhead distribution mains, which were mostly #6 w.p. copper.

In the postwar period, we began to expand the 4 kv system in a conventional manner, except that outdoor unit-type substations were installed instead of the costlier indoor stations. We continued in this manner for several years until load growth began to overtake our expansion efforts. Many 4 kv circuits were too long and fully loaded, and right-of-way for new substations was difficult to obtain at critical locations, where needed.

Engineering Study Completed

In 1953, an extensive engineering study was completed, which indicated that it was desirable to contain the 4 kv system at the capacity it then had and to provide for new load growth with a 13.2 kv distribution system within the same areas. Since a change to this 7,620/13,200 volt system was clearly indicated, it was decided to discontinue the purchase of any additional 7,200 volt distribution transformers. Instead, 7,620 volt units with two 2½ per cent taps above and below normal were purchased. By varying the tap setting, the transformers would operate on either the 7.2 kv system or the future 7.6 kv system and, thereby, eliminate the need for a duplicate stock of transformers.

Routine plans were completed for converting some 4 kv load to the 12 kv system in border areas and for a modest conversion of 4 kv load to a new 13.2 kv system. But, before any construction work was started in 1954, we were hit by an early summer wave of high temperatures which precipitated a public buying spree of air conditioning units.

The temperature remained high, and in a short time we were experiencing heavy overloads and low-voltage conditions on the entire distribution system. These conditions existed on secondaries, transformers' primaries, and substations. The unexpected, but not unprecedented, temperature reached a peak of 113°.

The load on the 4 kv system was 100 per cent of its 230,500 kva capacity, but individual circuits were as much as 25 per cent overloaded. These overloads and low-voltage conditions disappeared only with the advent of cool fall weather. We managed to survive this modern nightmare without loss of any major substation units, but the failure of the 4 kv system to withstand customer demands for zero diversity air conditioning power left these customers with a somewhat shaken confidence in our service. In order to guard against a similar occurrence if the next summer should repeat the 1954 temperatures, plans were made for drastic measures that would cut sufficient load from the ailing 4 kv system.

In September of 1954, it was determined that nearly 50,000 kva would have to be removed from the 4 kv system in order to reduce the load to about 90 per cent of capacity and to provide for an expected 14 per cent load growth. We knew that several years would be required to accomplish this task with our own personnel. Other pressing construction work had to be completed by our crews, and, since only nine months remained before a new summer peak load, it was decided that an outside engineering firm would be given the entire project, including engineering, estimating, supervision, material handling, construction, and inspection. This was done in September of 1954, and conversion at our company was begun.

It was planned to build a series of backbone 13.2 kv feeders that would be routed through areas which were some distance from the 4 kv substation locations and to convert the ends of the 4 kv circuits, thereby providing both load and voltage relief to those areas.

Construction of Feeders

Five long new feeders were constructed with 477 MCM all-aluminum phase conductors and a reduced #3/0 all-aluminum neutral. The feeders were installed on a basic 45-foot pole height, using wide-groove pin-type insulators on 8-foot arms with wood braces.

The conductors were protected from abrasion at the points of support by flat armor tape. The neutral was installed on the pole below the crossarm. All conductor accessories were of the compression type. A number of hook-operated 400 ampere load break sectionalizing switches were installed in each feeder.

Several feeders were connected to our power house busses through existing underground cables. Reactors were pole mounted on the underground cable terminal poles to limit fault current to 4,000 amperes on the new 13.2 kv distribution circuits. Pole mounted, 280 ampere, three phase oil circuit reclosers were employed for feeder protection on these circuits. The other feeders were connected to 161/13.2 kv bulk substations.

Station type reactors were installed in these stations, but no separate oil circuit reclosers were

needed since modern high-speed relaying equipment of sufficient capacity was already in use. Once the feeders were constructed and energized, the actual work of conversion and load transfer was started.

Permits were obtained to trim trees for additional clearance from primary wires and for extending primaries to shorten lengthy secondary runs. Tree trimming crews performed this work in advance of line construction.

Line construction was started by reinsulating and respacing energized primary conductors. Defective poles and arms were replaced, and higher poles were installed, if needed, to extend the primaries.

The primary neutral was allowed to remain with the phase wire on 6-foot or longer arms, if the arms were in good condition. If the arms were not in good condition, the neutral wire was lowered to the secondary position and the phase wire was transferred to a pole-top pin, thereby eliminating the need for a new crossarm.

Installation of Transformers

With this work completed, the new transformers with made-up risers were installed on the poles. Transformers were the CSP type in ratings of 5 through 100 kva single phase and 30, 75, 112½, and 150 kva polyphase. Some conventional transformers with 50, 75, 100, and 167 kva were also installed. Most units were pole mounted, even to the extent of cluster mounting three 167 kva transformers on a single pole.

In cases where a new 7,620 volt transformer had to be installed on the same pole with an existing 2,400 volt transformer, the 2,400 volt unit was lowered and kept energized and the 7,620 volt transformer mounted in its final position.

When all new transformers were in place, linemen were stationed on each transformer pole and the entire 2.4 kv leg was disconnected from its source. All 2.4 kv transformers were then disconnected from the line, and the 7,620 volt units were connected. The leg was then re-energized from the 7,620 volt feeder through a 5,000 ampere heavy-duty fuse mounting fused with a 102 ampere link. With service thus restored, the 2,400 volt transformers were removed and later reinstalled in 4 kv areas that were not to be converted, in order to increase capacity and shorten secondaries in those areas.

Three-phase line conversions were accomplished in the same manner except that three-phase stations were generally reconnected for open-delta operation, requiring only two energized primary conductors. All single-phase stations were transferred to these two conductors, and the third conductor was converted to 7,620 volt operation.

The single-phase load was then converted and connected to the 7,620 volt conductor. The three-phase stations were converted by removing the open-delta bank, installing a new polyphase transformer, and energizing the other two phases at 7,620 volts. The single-phase stations were later balanced among the three phases.

Customers were advised several days in advance of scheduled conversion outages by means of cards delivered to their homes. Outages were planned for hours of the day and days of the week which would be least inconvenient to customers, and every effort was made to keep outage time to a minimum.

The original conversion project starting in September of 1954 was completed in the summer of 1955. In addition to converting some 50,000 kva load, much work was done in respacing and adding transformers on the remaining 4 kv and 12 kv systems.

Also, over 30,000 kvar of primary shunt capacitors were installed on the system. These consisted of 300 kvar units factory wired and assembled. Some units are fixed on the line and remain in service 24 hours every day during the summer months. Other units are switched by current-sensitive relays, time clocks, or temperature-sensitive thermostats.

Many serious problems were encountered in the original conversion project. Standards of construction had to be developed for the new system. These standards were changed several times during the conversion program, which caused some confusion.

Vast quantities of materials were needed, and many of these materials were new to our company. The contractors had to arrange various show-up locations for construction crews, who were assembled from all over the nation.

During the peak construction period about 1,000 men were at work on the project. Supervision and orderly work procedure were of paramount importance. Since we have an extensive joint-use system with Southwestern Bell Telephone Co., that company was called upon to change many poles and to transfer many attachments. To accomplish this task, the telephone company brought in crews from other areas and soon was facing problems which paralleled those of our contractors.

Since the load to be transferred to the 13.2 kv system was obtained from many areas served by various 4 kv substations, the 4 kv circuits could not be entirely removed from the converted areas. Therefore, a sizeable number of 4 kv lines were underbuilt on the new 13.2 kv circuits. This procedure caused serious congestion on junction poles and crowded the normal working space.

Problem of Tree Clearance

This problem became more acute when our company instituted a hot-stick working rule for the 12 kv and 13.2 kv systems midway through the original conversion project.

Another problem of considerable significance was encountered in trying to obtain tree clearance in areas where we had installed either aerial cable or tree wire on the 4 kv system or had no primaries at all. These efforts were mostly successful. No 13.2 kv aerial cable was installed, and very little tree wire was used on the new system.

With the original conversion project in operation, plans were made for converting additional 4 kv load before the 1956 summer peak. Kansas City Power & Light Co. personnel planned and engineered this work. However, some estimating work and a major part of the construction work was contracted, but field supervision was done by our own supervisors. About 13,000 kva load was converted in this manner on this second year's program.

At present, we are actively engaged in our 1957 conversion effort. By July 1, we had added about 13,000 kva additional load to the rapidly growing 13.2 kv distribution system. This year's work was planned, engineered, estimated, and

is being constructed entirely with our company personnel. We expect to continue converting about 10,000 kva load every year for some time to come.

Conversion work today proceeds smoothly in comparison to the original program. We know that conversion must be a continuing year-round program. The 1958 work is already planned and partly engineered. Money has been authorized, and our estimators will soon be sending individual conversion jobs to our construction departments.

Construction will be started in midsummer shortly after completion of the present conversion project. Today we have a fine, new, and proven set of construction standards that are followed very closely in the field. Materials have been standardized and adequately stocked and present little or no problem.

Most of the new 4 kv work is constructed for 13.2 kv operation, and future conversion of such work will require only re-fusing and transformer changes. Throughout the year as much new load as possible is added to the 13.2 kv system rather than to the old 4 kv system.

Better Equipped for Conversion

We are now better equipped for conversion work than we were three years ago. We have a pay-out reel stringing rig which allows us to pull in as many as four conductors under tension at one time. We expect to purchase a similar take-up device which will further increase our wire-stringing efficiency when it is placed in service.

We have mobile transformer wagons for either single or three-phase service. These are equipped with special transformers with dual primary windings and a wide range of tap settings.

By merely turning two dials we can use these wagons on either the 4 kv, 12 kv, or 13.2 kv system. These units provide emergency service when needed for power bank failures and also serve to facilitate conversion of transformer stations, particularly three-phase stations. They allow the completion of considerable conversion on weekdays during daylight hours which would otherwise have to be done as overtime work.

By doing most of the conversion work in the fall and winter months, we gain some important advantages.

Tree trimming work is not as noticeable or objectionable from the customers' viewpoint. Less property damage is done to shrubs and flower gardens in rear property lines in the winter months.

One of the most important advantages stems from the absence of air conditioning load during these months. Most three-phase residential power banks serve only air conditioning loads and can be de-energized for a time interval without customer objection.

In addition, in residential areas single-phase secondaries can be banked together during construction with less expense to us for transformer work and less outage for the customer. For example, in a rear property line served by a 2.4 kv leg and three existing 2.4 kv stations, we can bank all three secondaries together (our secondaries are generally continuous and broken only by strain insulators) and remove the middle station entirely without an outage. A new 7,620 volt station is then installed and made ready for service. In a short time the remaining 2.4 kv stations can be disconnected, the leg tapped to a 7,620 volt phase, and the new 7,620 volt station connected to serve the banked secondaries. The other 2.4 kv stations are removed and replaced with 7,620 volt units. By unbanking the secondaries, the conversion is completed. This procedure could not be followed during air conditioning season because of load and voltage conditions.

Conversion Project Costs Vary

Costs of conversion projects have declined in successive years but still vary widely among projects. The average conversion job will cost about $10 per kva of installed new capacity for construction work only, exclusive of any large feeder construction. The cost of feeders will vary, depending on the amount of underbuild, but will be about $18,000 per mile for backbone construction of 477 MCM aluminum. The crews' time on a conversion job will be devoted about 65 per cent to construction, 20 per cent to removal, and 15 per cent to pole and conductor maintenance.

As conversion work proceeds each year, our 4 kv circuits are being pulled in closer to their substations. Islands of 4 kv loads are being formed, and, while gradually decreasing in size, the islands will remain until it is economical to remove the substations.

A new distribution system is emerging which is cleaner and more able to meet the rigors of air conditioning demands. We expect the new 13.2 kv system to provide a high quality service to customers in this metropolitan area for many years to come.

Recent EEI Publication

Electric System Load Forecasting

EEI Pub. No. 57-3. A Report of the System Planning Subcommittee of the Electrical System and Equipment Committee, Edison Electric Institute. 24 pages. Price: 70 cents to members and their employees.

This report utilizes a survey of 34 utilities in the U. S.—ranging in size from the largest to some having a current annual peak load of about 200 megawatts—as well as other information. The methods and factors involved in making electric load forecasts as outlined in the booklet are in general use by a large number of utility organizations. The principal factors and procedures bearing on load forecasting are discussed and some specific forecasting methods used today are reviewed.

A Catalog of

EEI Publications

is available upon

request to:

Edison Electric Institute

420 Lexington Ave.

New York 17, N. Y.

Let the Last Man Know

By J. J. Misic

General Supervisor, The Cleveland Electric Illuminating Co.

An address before the 1957 National Conference of Electric and Gas Utility Accountants, Washington, D. C., April 9, 1957

THE practice of effective communication in any modern utility should present no particular problem. Obtain some stationery, write some procedures, provide the necessary telephone and office equipment, hire some people to use them, and you have a communications system. Yet no one the least bit familiar with the complexities of today's utility business would subscribe to this over-simplified view. Rather, everyone generally admits that despite the efforts expended the communications problem is with us now and will continue to be.

This feeling has motivated utility managers and administrators to continue to seek improved means for carrying out their responsibilities for communications. Leaders in this communications area recognize good customer relations as one of their prime objectives. Their recognition of the problems and their response to this challenge have improved customer relations.

There is a constant need to emphasize the ever-increasing importance of top-notch relations in serving the public with utility services. The vital role that customer contact people play in the maintenance of these favorable relations cannot be stressed too strongly.

Although utilities are literally tied to their customers with wire, pipe, and cable, the customer is purchasing an intangible. Equally intangible in the customer's mind is the person who sells him this service. This situation leads the customer to consider any employee he talks to as being "the company." Obviously then, it is essential that employees contacting customers are informed on company policies, practices, and procedures.

With the acceptance of these conditions, the question becomes one of determining the most successful communication techniques and practices. Needless to say, the means used by the individual organizations vary. However, a number of the old, but sound, methods are in general use. These include such devices as house organs, formal employee training programs, written procedure or policy manuals, and memorandum-type mailings. The effectiveness of these vary. As a result, some interesting and, in some cases, novel methods have been developed.

Recognizing the importance of the family, several utilities hold periodic meetings with employees and their wives. At these meetings general company matters are reviewed and pertinent policies and practices are discussed. The philosophy here is that with the wife being brought into the picture, the employee will take an even greater interest in the various phases of the company's operations.

A number of companies make direct mailings to employees' homes when policy changes occur or when further interpretations of existing policies are deemed desirable.

Questions and Answers

Based on the success experienced where it has been tried, other utilities may find it advantageous to use the question and answer technique. This involves the preparation of appropriate questions and answers to points which the customer may be expected to raise. Such a device is particularly suited in situations where major policy changes are made.

While the examples listed are representative of the means available to get information to customer contact employees, no communication line is complete without effective supervision. No substitute has been developed to offset this need. Further, it is unlikely that any will ever be devised.

Supervisors of customer contact personnel must understand company policies and practices. They must also recognize their communication responsibilities as they apply to customer relations. This necessitates a good up and down, day-to-day communication with their people, regardless of any other means employed on an overall company basis. Effective communication has a two-fold gain. Not only will employees do a better job with the customers, but good employee relations will be fostered.

Summed up, the questions used in several popular management programs apply in these areas of communication. An objective approach to these points will yield benefits to any organization interested in improving employee communication.

Why should we communicate effectively?

To insure that each employee is in possession of the facts which are necessary to him in representing the company.

What do we tell our people?

Everything that is necessary to further their own, and the customers' pride, loyalty, understanding, and trust in the company.

When should we tell them?

As soon as possible and certainly before the information is communicated to the customers. A further worthwhile goal here would be to beat the organization's "grapevine."

How can we communicate effectively?

Consider every known tool of communication. Within the range of methods from direct personal communication, memoranda, and public address announcements, a suitable plan can be developed to fit any organization.

Who is included in this communication?

Certainly all personnel who have responsibilities for customer contacts. To the extent practical, it is desirable to keep all employees informed.

Working on the assumption that if you can't measure it, you can't talk about it, some utilities have developed techniques for evaluating the effects of the communicated policies and practices on customers.

The most generally used means of evaluation involves day-to-day feedback of customer reaction by customer contact employees. While practices vary on the recording and analysis of the information obtained through this medium, it has offered a number of

(*Continued on page* 247)

Improved Controls for Overhead Construction Costs and Manhours

By A. E. Fehlenberg

Assistant to the Superintendent of Transmission and Distribution, Union Electric Co.

Presented before the EEI Transmission and Distribution Committee Meeting, Kansas City, Mo., May 2, 1957

IN recent years, the Union Electric Co. experienced a period of rapid expansion and reinforcement of its distribution system, resulting largely from an abnormal increase in air conditioning load above the normal year to year general load growth.

Overhead facilities have mostly been affected by this increased load growth, requiring many transformer replacements, reinforcement of secondary and primary circuits, line extensions, and building of supply lines and distribution circuits for new distribution substations. In 1956 this involved some 840,000 manhours of overhead work in the St. Louis City and County, an area of 550 square miles.

Because of the increasing work load and complementary expansion of personnel and equipment, it became obvious that a more meaningful method of determining manpower and equipment requirements and the control of costs was necessary, both for guidance within the department and for managerial review and decision making.

In the past, all cost information was allocated at the source into Operation, Maintenance, Construction, and Retirement accounts in conformance with regulatory commission requirements. A satisfactory method of cost control or measure of work performance was difficult under this system.

An expansion of the basic Federal Power Commission accounting system to provide further breakdown within the Operation and Maintenance accounts was for sometime followed, but this also proved unsatisfactory. This failure to obtain the needed cost information results because the greater part of distribution expenses are chargeable to Construction and Retirement accounts, and Maintenance and even Operation expenses are substantially interrelated with the Construction and Removal work.

The accounts prescribed by the FPC are designed to record costs, but do not furnish information as to the nature of a job, the reason why the work was done, the manhour and material requirements as related to the various types of work, and the efficiency of the manpower. By development of this further information, prediction of manpower, material, and equipment can be more accurately effected, and a means of cost control provided. This report describes the development of such a system.

Requirements

Accounting information was needed to satisfy the following requirements:

1) The work load should be expressed in terms of a basic, relatively unchanging unit, such as productive manhours, so as to historically provide a measure of types of work, and enable prediction of manpower needs in the field by types of work.

2) Historical costs on material usage should be related to productive manhours, to enable prediction of total costs on the basis of projected manhours future work load in the various types of work.

3) Data should be in a form whereby cost and performance analysis can be made by types of work, geographical districts, and individual work groups, such as line crews.

4) Data should be applicable to preparation of an annual five-year budget and a 10-year outlook, meaningful to management in long range planning.

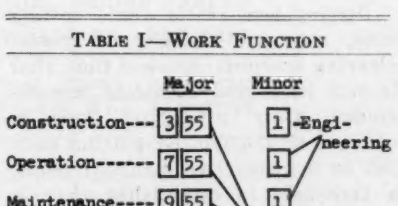
The Approach

Since the company's accounting system is based on rules set forth by regulating commissions, charges applicable to these accounts could not be altered. Therefore, a system of accounting was devised that would accomplish the aforementioned requirements and yet tie-in with the regulatory accounting, so that charges could be translated in terms of these accounts. Furthermore, the accounting designations were simplified and limited to office use and processing as much as possible, thereby reducing the amount of field accounting to a minimum.

The 300 and 700 series of the Federal Power Commission major accounts were retained for Construction and Operation respectively; but a 900 series to replace a 700 series was established for Maintenance. The last two digits of each major account series, indicating the work function, were generally made numerically alike for each work function, thus simplifying the accounting.

The work functions are General Overheads, Substations, Overhead Lines, Underground Lines, Line Transformers and Devices, Meters, Street Lights, and Customer Premises. A further breakdown of each work function into engineering, supervision, clerical, etc., is accomplished by affixing a single digit minor account. Thus engineering involved in the Construction, Operation, or Maintenance of distribution overhead lines is designated as follows:

TABLE I—WORK FUNCTION



In order to differentiate between the reasons why the work is being done, each type of work is further identified by a Work Reason Number

which is reported along with the major and minor account numbers. A Work Reason Number was set up for each type of work: such as, Work Reason No. 1 covers all new business connections; Work Reason No. 2 covers changes in load; Work Reason No. 3 covers all street lighting work, etc. Table II (right) shows the work reasons which are applicable to work done in the Overhead Construction Division.

There are other work reasons which apply to other functions within the Transmission and Distribution Division.

The descriptions shown in Table II are in condensed form, but are described in detail in the manuals used by the engineers, estimators, and field forces.

Every job carries one work reason. There are, of course, a number of jobs which could involve more than one work reason, but the work reason in which the work predominates is chosen so as not to complicate the picture. Thus, the engineering for stringing a new conductor to a new customer, classified as New Business, the accounting designation is in Table III.

All work is expressed in productive manhours by account and work reason for each job. Materials used are allocated in the same manner.

Determination of Work Load

The first step toward determination of the work load was to establish a clear-cut break between producing and non-producing manhours. This is accomplished by having each overhead crew keep a record of the actual time worked by the men, driving time between jobs, delay time due to waiting on other utilities or for other reasons, and time required to load and unload the trucks.

Driving time, delay time, waiting time, etc., are charged to special clearing accounts. Allowed time, that is sick leave and vacations, are excluded. Only productive time is charged to the job. By placing each job on a productive manhour basis, a threshold is established that is changed only by the efficiency of the men in performing their work and the extent to which time can be lessened by means of mechanization.

To arrive at total cost for a job, the manhours are converted to dollars, taking into consideration whether the time was worked on normal or overtime. The dollar cost per hour is factored up to include the cost of non-productive time and fringe benefits; such as meetings, weather time, traveling and driving time, delay time, sick leave and vacations.

To assure uniformity of time taken to do a given work operation, timing units have been set up for each general kind of work operation. Two kinds of timing units are used: One which ties-in with the installation of materials or equipment, called a material timing unit; and the other which ties-in with an operation, such as moving a wire, where no new material is involved, called a non-material timing unit. These timing units were originally developed some years ago when the company maintained a bonus plan system and have been re-activated and modified as required to suit present day conditions.

By means of the timing units, an estimate of the total number of productive manhours required to do a job can be calculated. Efforts are made to keep actual manhours reasonably close to estimated manhours on an average basis. Estimated manhours can, therefore, be used to predict future work load.

Processing of a Job

When an inquiry for a new service or other type of work arrives from the Sales Department, the Design Engineer in the Engineering Department decides on how the customer will be supplied and prepares a preliminary layout showing the facilities involved. The job then moves on to the estimator who makes a field trip and estimates the number of manhours and materials required.

Manhour requirements are determined on the basis of the timing units which have been set up for each work operation. All accounting on such estimates is done by the estimator who determines the charges applicable to each account. The job then moves on to a pricing clerk for pricing and determination of the total cost to be covered by Work Order Application if the amount exceeds standing work order limits.

When the job gets out into the field, the crew foreman proceeds with the work as estimated. The truck driver on the job, however, has been assigned to keep a continuous record, by estimate number, of productive time. It is, therefore, possible to determine, after the driver's record has been routed to the office, the number of productive manhours which have been actually used on a given job as identified by the estimate number.

If the actual manhours differ from

TABLE II—WORK REASONS IN OVERHEAD CONSTRUCTION DIVISION

Work Reason Number	Type of Work
1	Line extensions—new business
2	Load additions to existing connections
3	Street lighting—new business
4	Transformer installations and replacements
5	Line construction for substations
6	Line conversion to 12 kv
7	Other line reinforcements and improvements
8	Cost of land for rights-of-way
10	Repair of damage by trees
11	Repair of damage by storms
12	Repair of damage by public
13	Replacement of defective equipment
17	Line rearrangement at customer's request
18	Line rearrangement at government's request
19	Line rearrangement at telephone company's request
20	Line rearrangement for engineering or operating reasons
23	Routine tree trimming

TABLE III—ACCOUNTING DESIGNATION FOR NEW BUSINESS

Division	Major	Minor	Work Reason	Budget	Work Order
20	355	1	1	27	15000
Geographical District	Work Function		Type of Work	Department Doing Work	Authorization

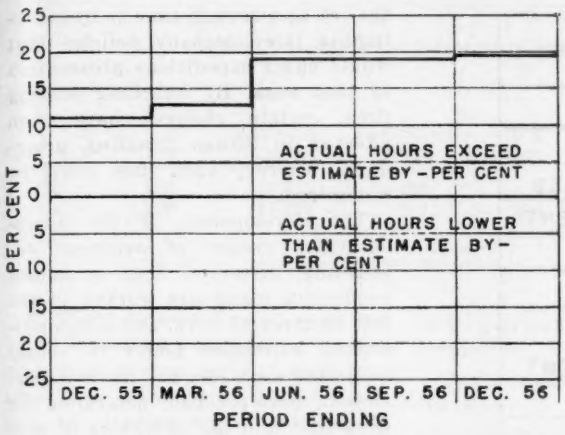


Figure 1—The curve of the performance of an overhead crew.

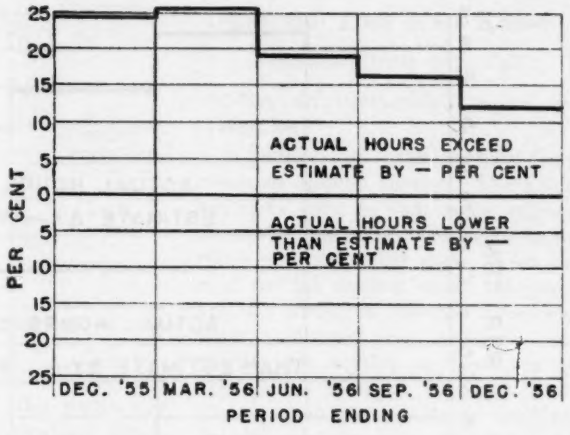


Figure 2—An overhead crew that has made some improvements.

the estimate, the allocations to each account are redistributed in proportion to the estimated distribution. These actual manhours, compared to the number of manhours which had been estimated, give rise to a means of determining the performance of a crew, called "Estimate Comparison." In developing the system of Estimate Comparison, the Union Electric Co. has received help and advice from other companies; in particular, The Detroit Edison Co. which has done remarkable pioneering work in distribution cost analysis.

Estimate Comparison

The actual productive manhours recorded on a job always cannot be compared directly with the productive manhours originally estimated. This is true because after the crew progresses with the work, changes may have to be made from the original plan. When such modifications are necessary, the crew foreman checks with the estimator and explains the circumstances. A record is made of this change. Later, when the job is completed and enters the Estimate Comparison stage, adjustment of estimated productive manhours is made.

Although for any one job there may be some variations in the estimated productive manhours because of unpredictable and uncontrollable circumstances as in the case of a subdivision job where the men may run into considerable difficulties because of mud or, in another case, the traffic conditions on a highway may be a deterring factor, these are expected to equalize among the crews over a reasonable length of time.

In the beginning, crews were compared on a quarterly basis, but experience indicated that the aforementioned factors created some inequities. In order to overcome this, the comparisons are now based on a rolling 12-month average every quarter. This gives trend information on each crew and, together with a quarterly record, gives a pretty good idea of crew performance. It is realized that a crew should not be solely judged by this record alone, as the quality of the work also must be considered. Furthermore, if the foreman is to be charged with the responsibility for the work performance, other matters such as employe relations enter into the evaluation.

This judgment factor lies with the superintendent who daily visits each one of the crews in his district to lend advice and aid in the planning of a job, so as to assure optimum efficiency and that the work is being performed in a satisfactory manner.

Figure 1 shows a curve of the performance of one of the crews.

The heavy black horizontal line in the center of the chart is at the level where the actual productive manhours taken to do the work are equivalent to the manhours estimated. The solid curve is a 12-month average expressed in percentage. This particular crew has not been meeting the estimates which, in this case, can largely be charged to the inability of the foreman to plan and supervise the work properly. Figure 2 shows a crew that has made some improvements.

Figure 3 shows a curve of a crew

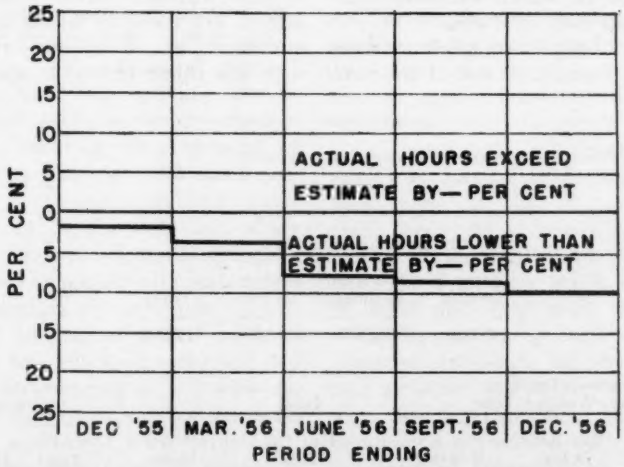


Figure 3—An overhead crew that has been doing much better than the estimate.

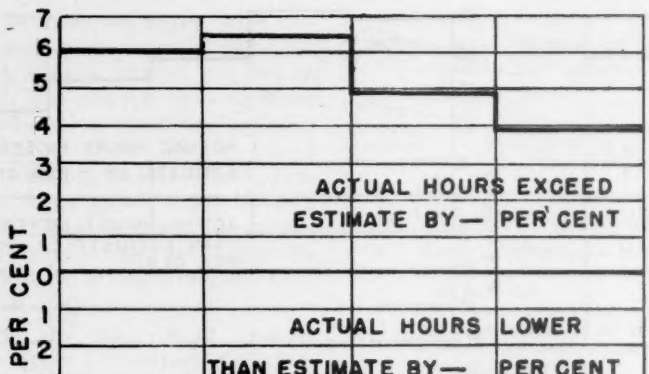


Figure 4—The average performance of the entire overhead division.

who has been doing much better than the estimate.

Others could be shown which fall somewhere in between these extremes. It is obvious, therefore, that in planning for manpower requirements as based on projected work load, the average performance of all crews must be used.

Figure 4 shows the average performance of the entire Overhead Division.

It will be noted that at the present time the actual productive manhours are only 3.9 per cent above the estimated manhours. Also, a general improvement has taken place over the period in which estimate comparison has been in force.

As an additional guide toward lowering costs, a record of the various components comprising nonproductive time are kept and constantly reviewed.

Data on driving time has been a great help in determining requirements for decentralization of works headquarters and has resulted in the establishment of works headquarters by districts so located as to reduce the total driving time to a minimum, consistent with the cost of construction, maintenance, and operation of the works headquarters.

Delay time which is usually brought about by waiting for another utility to appear on a job to move its wires or other facilities is also watched rather closely and efforts are made to reduce this to a minimum, either by pre-arranging with the other utility to appear on the job at a certain time or by establishing inter-company policies that would effect expeditious prosecution of this work. By watching loading time, certain changes have been effected in Stores handling procedures whereby such time could be minimized.

The development of the aforedescribed system of overhead accounting, historical data on actual productive manhours worked in the field by types of work, and a comparison of estimated hours to actual hours for each job, has made it possible to more precisely determine the work load and the budgeting of personnel and equipment commensurate with the work load requirements. It has also given data whereby the performance of the overhead forces can be improved by coaching and establishing better methods and procedures for doing the work.

Cost Reports

Cost analysis, to be of practical use, should be presented in informative reports which do not demand a translation of accounting symbols into the language of the line and management organizations. Monthly figures are of value only in comparison to previous months. Four basic reports are prepared in the Union Electric Co.:

1) System Cost report on a year-to-date basis for management's use. The data are by work reasons or groups of work reasons by the major responsible departments. This report is somewhat unique in that costs are all inclusive without an accounting breakdown into Operation, Maintenance, and Construction.

2) Overhead Line Crew Report showing the details in Table IV.

TABLE IV—OVERHEAD LINE CREW REPORT

		Productive Manhours			
District	Crew No.	Storm & Trouble	Work On Estimate	Other Work	Total
S		2,163	12,555	2,507	17,225

Hours — Driving, Delay, Weather Time			Total	
Driving	Load & Delay	Weather	Hrs. On Job	Allied Hours
4,432	1,089	472	23,218	4,013

TABLE V—WORK REASON REPORT

	Payroll				
Mo.	Prod. Hrs.	Amt.	Mat'l & Expense	Contract Bills	Total Chgs.
1	14,239	66,477	65,603	3,302	135,382

Budget or Group						
Productive Manhours			Total Charges			
Oper.	Maint.	Const. & Removal	Oper.	Maint.	Const. & Rem.	Contractor Hours
1,867	470	11,902	8,971	2,713	123,698	595

TABLE VI—ESTIMATE COMPARISON REPORT

District	Crew	Estimate Number	Estimated Hours	Actual Hours	Hours Variation	Per Cent Variation
SE	202	11,176	408	413	5	1.2
S	210	17,834	551	506	45	—8.2

3) Work Reason Report produced by IBM machines monthly by budget or budget groups, and by work reason. This information is the backbone of planning and forecasting. It is shown in Table V.

4) Estimate Comparison Report. About 70 per cent of the productive crew hours are covered by work in which the time is estimated on the basis of timing units. The estimate comparison report contains all jobs completed by the work forces during the preceding month. It is shown in Table VI.

With a growing work load in overhead construction activities, it has been necessary to add personnel and equipment. During this year, 12 seven-man crews are expected to be added in the St. Louis City-County area, with almost an equivalent number in 1958. This requires an extensive training program which must be fitted to the manpower additions. Planning in advance is, therefore, necessary.

In order to determine personnel and equipment requirements, a yearly budget forecast is made, projected five years in advance.

First, the historical work load by work reasons is determined from the accounting records. This is expressed in productive manhours required to do the work. With the help of the Sales Department's forecast of business activities, lists of new customers which are known to be established on our lines in the future, activity of the residential housing program, and any other statistics which may be available, manpower requirements by work reasons as determined by historical data are extended and modified over a period of five years.

Against this is compared the actual productive manhour availability in the overhead division based on past experience. By comparing these two quantities, additional personnel and equipment requirements can be determined.

To determine the dollar budget for the five-year period, the manhours are factored by the prevailing applicable average wage rate per productive manhour based on actual payroll dollars. This figure, therefore, includes the non-productive time allowance and all fringe benefits. The time of the foremen and the overhead superintendents is also charged. Material cost is determined on historical experience of materials required per productive manhour of work by type of work.

Conclusion

The foregoing discussion on accounting as pertaining to overhead work is, of course, briefly stated. The major reports mentioned are augmented by others as overtime, absences, and other specific items. Results obtained from this new method of accounting and cost control are well worth the manhours required for its development.

For the first time it has provided an intelligent medium for sound future planning and has developed information on performance heretofore unknown or requiring detailed analysis.

It should be understood that all this has been accomplished with a very small increase in the clerical group, as most of the processing of the data is done by IBM machines. Reporting of time in greater detail is required in the field but, since field accounting on estimated jobs has been completely eliminated and the accounting on other jobs simplified, the amount of pencil work in the field has not been increased. No precise information is available on the total cost of processing the data, but the additional cost, principally in machine operations, is relatively small compared to the benefits that are derived.

Let the Last Man Know

(*Continued from page* 242)

utilities an inexpensive means for evaluation.

A number of utilities have used customer opinion surveys. The actual practices vary in that some surveys are maintained on a continuous basis, while others conduct these on an annual or "as needed" basis. Surveys may be conducted through interviews with customers by company employees, by outside agencies, or by appropriate company mailings. Policies to which the customers react adversely are easily identified with these surveys. In addition, a further gain is obtained since customers generally appreciate the interest shown by the utility.

Another method of evaluation used is the monitoring of incoming customer phone calls. Most utilities using this method report a two-fold gain. Not only does the observer obtain an indication of the customers' feelings toward the company, but also gets a measure of the employee's performance.

A number of utilities have conducted employee surveys. Using this tool companies have found almost without exception that most employees feel that communications are not adequate.

This indicates that despite the gains already made, the efforts and techniques for communicating must be made more effective. It also suggests that consideration be given toward improved measuring of the results obtained in communicating policies to employees. Because of the adverse effects which ineffective communication can cause, it is essential that no area be overlooked for improvement.

In summary, it is evident that although substantial improvements have been made in the communications area, there are no really new techniques. Rather, variations of the old established methods are being made to meet new conditions effectively. With the continuing needs for good customer relations, the communication problems will become more complex. The development of better communication presents a real challenge to personnel charged with responsibilities in customer relations — one which will be met successfully.

A New Approach to An Old Idea

By Customer Relations Staff
Southern California Edison Co.

THE elementary principle that business success depends upon getting along with the customer is hardly original or unique to our present day and age. From the dawn of commerce, when the first paleolithic entrepreneur hawked his stone axes and dinosaur hides, customer satisfaction has been recognized as the basic requisite to business prosperity.

During each succeeding historical era, wise men have built their reputations on such glittering generalities as "The Customer Is Always Right," "The Customer Is King," and "The Customer Uber Alles."

Without fear of contradiction then, let us admit that businessmen today are aware, in theory at least, of the importance of good customer relations. From the corner grocer to the corporation executive, these men recognize the direct relationship between sales and profits and the many intangibles that go into the development of public opinion and customer attitude.

Utility companies have been particularly sensitive to this relationship and not just in recent years. On Sept. 26, 1905, John B. Miller, first president of the Southern California Edison Co., established certain customer relations principles as a permanent Edison policy in an open letter to all company officers and employees. The letter stated:

> "The Edison Electric Co. desires to have the confidence and respect of the public, with which it deals. Officers, agents and other employees should, in every reasonable way, endeavor to increase that confidence and respect by doing everything in their power to make the name of the Edison Electric Co. synonymous in the mind of the public for good service, square dealing and courteous treatment."
>
> "The public gains its impression of the company through contact with its representatives, and they will, therefore, be held responsible in every instance for carrying out the well established policy of the company—'Good Service, Square Dealing and Courteous Treatment.'"

On the 50th anniversary of that letter, Harold Quinton, president of the Southern California Edison Co., reaffirmed the "basic policy and timeless principles," as outlined by Mr. Miller, in a memorandum to all members of the Edison family. Framed copies of both documents are hung in offices throughout the Edison system and a bronze plaque, quoting Mr. Miller's letter occupies a prominent position in the lobby of the Edison Building in downtown Los Angeles.

The past half-century has seen a steady adherence to the policy of "Good Service, Square Dealing and Courteous Treatment" by Southern California Edison personnel with the end result that this company has retained its high standing in the eyes of its customers.

Population Affects Practices

An unparalleled influx of population into Southern California during the past decade made it obvious, however, that existing customer relations practices of Edison would require some supplementation to carry the increased load.

In early 1955, the company management expanded the utility's customer relations staff and charged it with the responsibility for the development of an integrated plan to measure general customer attitudes, specific opinions regarding service performance, and the relative frequency of customer complaints.

These were the measurement devices, sharing the mutual purpose of establishing a benchmark from which it would be possible to determine the status of the company's customer relations. The means of maintaining high standards existed in the field of employee training.

Edison's Customer Relations staff found the answer through membership on the Combined AGA-EEI Customer Relations Committee. This committee, after three years of intensive research, prepared a Training Package designed specifically for use by utility companies. The package includes a 200-page training manual, five sound-slide films, and a set of five followup booklets, each devoted to a separate phase of employee-customer relations.

A kit was purchased and a preliminary showing arranged for the company's top management. The presentation was integrated into the overall customer relations program for simultaneous endorsement at this one meeting. The combined program was received with genuine enthusiasm and arrangements made for its immediate institution.

Five additional Training Packages were purchased for circulation throughout Southern California Edison's five commercial divisions. In addition, 4,000 copies of each of the five followup booklets were bought for distribution to employees attending the training meetings.

In November and December, 1955, the Customer Relations staff conducted a series of introductory sessions for supervisory personnel in each division. The agenda provided for a general discussion of the complete customer relations program, indicating how each phase was designed to serve a specific purpose and how all phases, when combined, would accomplish the desired aim of continued customer good will.

The presentation required approximately three hours, the conclusion of which was devoted to the employee training program. Since the program was to be administered in the field by district supervision, it was essential that complete understanding be secured in order to avoid differences in interpretation or emphasis in the actual employee meetings. Provision was made for a discussion period during which it was possible to answer any questions as to the purpose or procedures of the training program.

Considerable interest in this program was indicated by the opinions expressed by the various supervisors at these meetings. It was generally

agreed that the Training Package would satisfy a long-existent need for a comprehensive and compact means of handling the vital subject of customer relations. When it was generally understood that the program was to be locally administered, the response was even more enthusiastic. This last point is easy to understand when full consideration is given to the fact that Edison employees in the districts look to their immediate supervisors for training in all aspects of their jobs. If a representative from the company's General office were to invade the local jurisdiction merely to conduct a training meeting on customer relations, the employees might easily adopt the erroneous attitude that "customer relations is a problem for the staff in the main office to worry about." This impression had to be avoided if the basic responsibility for customer good will was to be assumed by the first-line, customer-contact employees themselves. Experience has shown this to be a superior method in every respect.

Program Started in 1956

On Jan. 2, 1956, the program was underway. According to a prearranged booking schedule, each of the five commercial divisions began circulating one of the film-strips among its particular districts. Southern California Edison's service territory is geographically divided into 30 such districts which are grouped into five divisions. The booking schedule provided for the rotation of the five programs between divisions every three months. Thus, after 15 months, the rotation cycle would be complete with the employees of each district having attended all five sessions. With the exception of an occasional torn filmstrip or broken record which required replacement, the plan worked perfectly.

At the conclusion of the first, system-wide rotation, total attendance at the meetings was in excess of 8,000, including personnel from all departments and divisions of the company. The collective response to the program was such that a repetition of the series is planned for late 1957 and early 1958. This will serve to refresh the memories of older employees and will acquaint newer employees in the fundamental customer relations principles.

One final thought for those in the electric utility business who may have wondered about the usefulness of the AGA-EEI Training Package within their own organizations. Southern California Edison's Customer Relations staff has been conducting a closely-integrated series of customer surveys during the past year.

The results of these inquiries into the public attitude have clearly shown a marked improvement in employee awareness of the importance of good customer relations, evidenced by improved service performance, more "courteous treatment," and a genuine desire to deal squarely with the public.

That this improvement has devoloped coincidentally with the adoption and operation of the AGA-EEI training program is the most significant evidence we can offer as to its practical value.

Hudson R. Searing

Hudson R. Searing, chairman of the board and former president of Consolidated Edison Co. of New York, Inc., died June 26 in University Hospital in New York after a brief illness. He was 62.

HUDSON R. SEARING

Mr. Searing was president of the utility from 1949 to 1955, when he was elected board chairman. As chairman he also retained the post of chief executive officer which he had held since 1953 while serving as president. He was a member of the EEI Advisory Committee at the time of his death.

Born in New York, Mr. Searing attended elementary school here and high school in Seattle. He went to work for the old New York Edison Co. in 1909 as a telephone operator. He later transferred to the old United Electric Light and Power Co. as a meter tester. He began attending night sessions at Cooper Union in 1911 and in 1916 received an electrical engineering degree. After serving as a pilot in World War I, he returned to United.

He was assigned to develop an alternating-current, low-tension network having the proven reliability of New York Edison's direct current system. The success of this project halted further development of direct current in New York.

By 1932, Mr. Searing had become general superintendent of distribution for both United and New York Edison. These companies were merged into Consolidated Edison in 1936. In 1939 he became engineer of operations for that company. He was elected vice president in charge of electric and gas operations and electric production in 1940.

He was elected executive vice president of the utility in 1944 and in the same year was named as a trustee. In February, 1955, Mr. Searing was the first investor-owned utilities leader to announce that his company would avail itself of the revised Atomic Energy Act and build a full-scale atomic power plant, financing the plant by regular business methods. The company received from AEC Power Reactor License No. 1, which cleared the way for the 275,000-kilowatt plant now under construction at Indian Point, N. Y.

All of Mr. Searing's working life had been associated with the integration and operation of New York's electric, gas and steam utilities.

Mr. Searing was chairman of the board of the Consolidated Telegraph and Electrical Subway Co. and a director of the Delaware, Lackawanna and Western Railroad. He was a member of the Council of New York University.

Prime Movers Committee Meeting

J. M. Driscoll, *Chairman*

AFTER several meetings in the North, Prime Movers Committee members and guests traveled to the Deep South for the Committee's May 6-8 sessions. Meeting for the first time in its history in the state of Florida, the Committee convened at The Tides Hotel near St. Petersburg in the rapidly expanding area served by Florida Power Corp. This was the 91st meeting of the Committee. The crowded three-day agenda featured subcommittee reports, project reports, guest speakers and eleven hours of round table discussion.

On Monday morning H. K. McKean, vice president in charge of operations and engineering of the host company, welcomed the group to Florida and briefly described the company's system. Mr. McKean's remarks provided an informative background for the Tuesday afternoon inspection trip to the Florida Power Corp.'s A. W. Higgins station. Many of the company's key operating and engineering personnel attended.

The meeting was planned to accommodate the customary large agenda of round table discussion topics. This activity is regarded by the Committee as being of particular importance. To facilitate the round table discussion the meeting room was provided with an amplification system with six microphones located so as to give each person in attendance easy access to the speaking system. With this arrangement the 140 engineering and operating questions discussed allowed the exchange of experience and information on a wide range of technical steam electric generating station subjects.

The Monday session adjourned at 4 p. m. This is the usual first day schedule for Prime Movers Committee meetings with subcommittee meetings scheduled to follow the general session. This allows subcommittee meetings to be held prior to the subcommittee report session on Tuesday morning. At present, there are 12 subcommittees and a task force organized for the purpose of keeping the Committee apprised of developments in special areas of the science of steam station operation and design.

The Air Pollution Subcommittee's report was presented by its Chairman, W. C. Beattie. This report called attention to recent developments in the field of air pollution control affecting the electric utility industry.

R. W. Parkinson, Chairman of the Boilers & Combustion Subcommittee, reported on the status of the various assignments under way by this group. The Subcommittee is compiling information on low flue gas exit temperatures, coal handling and analysis, supercritical boilers, controlled circulation boilers, boiler reliability, outdoor boilers, cyclone fired boilers, and boiler casings and suspensions.

Air Heater Fires

Under the auspices of the Boilers & Combustion Subcommittee, W. E. Hammond, chief engineer, The Air Preheater Corporation, presented a paper on the subject of "Air Heater Fires." Mr. Hammond called attention to operating precautions that will prevent air heater fires. He also discussed steps that should be taken at the first evidence of a fire in an air heater. Mr. Hammond referred to an extensive testing project that has been conducted by his company on this subject and resultant information.

M. D. Engle, Chairman of the Fuel & Ash Handling Subcommittee, reported on the progress of an investigation that this group has undertaken on the utilization and disposal of fly ash.

The Metallurgy & Piping Task Force, the Committee's only Task Force, is under the chairmanship of E. H. Krieg. In addition to several Prime Movers Committee members, the Task Force includes five other specialists from the electric utility industry. Mr. Krieg's report was concerned primarily with the representation of the EEI on ASTM Committees concerned with power station piping.

R. P. Moore, Chairman of the Power Station Data Subcommittee, reported on the Subcommittee's activities since the February meeting. Committee members submit data sheets on new units to Mr. Moore for distribution to the Committee. The data sheets are accompanied by heat balance diagrams and boiler cross section diagrams. In the future turbine cross section illustrations will also be included. This activity has been of particular importance in keeping Committee members advised of station design trends.

The Power Station Chemistry Subcommittee is unique among the Prime Movers Committee's subcommittees in that it includes in its membership, in addition to several members of the parent Committee, fifty-one power station chemists from EEI member companies. W. L. Jackson, who has been chairman of this group for the past two years, reported on the Subcommittee's April 15-16, 1957, meeting at Fort Worth, Texas. This meeting was attended by 68 members and guests. The meeting was highlighted by reports from the Subcommittee's several sections that are concerned with corrosion, by-product utilization, air and stream pollution, lubrication, steam cycle carry-over, safety, and chemical cleaning. Mr. Jackson has been succeeded as chairman by R. F. Andres who has served with Mr. Jackson as Vice Chairman. I. B. Dick has succeed Mr. Andres and F. Van Orden, Jr., has accepted the secretariat for the coming year.

In 1954 the Prime Movers Committee established an award which is administered by the ASME to recognize outstanding individual or multiple author contributions to the literature of thermal electric stations, practice or equipment. J. N. Landis, Chairman of the Awards Subcommittee, reported on the status of this activity. Two awards have been made under this program by the ASME.

The Power Station Structures & Facilities Subcommittee has been active during the past year in investigating a number of subjects including fish problems in circulating water systems and current stack designs for steam electric stations. C. A. Dauber, Chairman of this Subcommittee, submitted a letter report advising that these investigations have been completed and soon will be available to the Committee.

Two particularly active groups are the Station Instruments & Controls Subcommittee and the Turbines & Condensers Subcommittee. W. Welch, Jr., and V. F. Estcourt, respectively, are the chairmen of these Subcommittees. Mr. Welch and Mr. Estcourt reported on the many projects being followed by their groups. For the past six months the Turbines & Condensers Subcommittee has collected

field reports on turbine and boiler outages. An interesting summary by Mr. Estcourt of these reports detailed the percentage of outage hours resulting from various factors.

The Prime Movers Committee participates in two joint activities with other EEI groups. F. F. Mautz and E. S. Van Nostrand represent the Committee on the System Planning Subcommittee of the Electrical System and Equipment Committee. Mr. Mautz briefed a report prepared by Mr. Van Nostrand, who was unable to be present. The report covered the activities of the System Planning Subcommittee as of its last meeting. J. E. Geue and E. B. Ripley are the Prime Movers Committee members on the Joint Fire Protection Subcommittee of the Electrical System and Equipment Committee, the Insurance Committee, and the Prime Movers Committee.

Three members of the Prime Movers Committee maintain liaison with other groups sponsoring research programs of particular interest to the Prime Movers Committee in which the EEI is participating financially. T. T. Frankenberg reported on the progress of the ASME High Temperature Steam Generation Project and R. A. Baker informed the Committee of recent developments in the projects of the ASTM-ASME Joint Committee on the Effect of Temperature on the Properties of Metals. R. M. Van Duzer, the EEI representative on the ASME Research Committee on the Properties of Steam, reported on the status of this ASME project directed toward extending the present steam tables.

On the afternoon of the second day the Committee inspected the A. W. Higgins Plant of the Florida Power Corp. Excellent arrangements were made for this trip by A. J. Ormston, the Florida Power Corp.'s representative on the Prime Movers Committee.

This meeting was the last under the general chairmanship of J. M. Driscoll, Consolidated Edison Co. of New York, Inc.; the Round Table chairmanship of V. L. Stone, Commonwealth Edison Co.; and the secretaryship of E. C. Duffy, Long Island Lighting Co. Next year's Committee activities will be chaired by V. L. Stone with Round Table being conducted by E. C. Duffy and the secretaryship of T. O. Thompson, Wisconsin Electric Power Co.

Transmission and Distribution Committee Meeting

G. H. Fiedler, *Chairman*

THE spring meeting of the Transmission and Distribution Committee was held May 2 and 3 at Hotel Muehlebach in Kansas City, Mo. The 150 members and guests were welcomed by C. M. Lytle, manager of system operations, Kansas City Power & Light Co., who stressed the need for bold thinking in reducing distribution plant investment and operating costs to keep pace with improvements in generation and transmission techniques.

General Engineering

The opening session was sponsored by D. Burns, Chairman of the General Engineering Subcommittee.

G. H. Landis reviewed current activities of the System Planning Subcommittee.

J. B. Hodtum, Allis-Chalmers Manufacturing Co., discussed economics of the ratio of copper to core losses in distribution transformers. He noted that the ratio for present designs is typically about 3.3. Estimation of the cost of losses over the service life of the transformer would appear to dictate a lower ratio but the resulting savings in losses may not justify the greater first cost of such a unit. Better industry-wide data on typical load cycles and costs of copper and core losses are needed before an accurate evaluation can be made.

T. C. Duncan outlined the program of study being undertaken by the EEI-NEMA Joint Committee on Higher Secondary and Utilization Voltages.

The remainder of the session was a closed discussion period devoted primarily to general discussion of joint use agreements.

Overhead

H. L. Livingood, Chairman of the Overhead Subcommittee, sponsored a session featuring discussion of 345 kv transmission line design.

D. Burns described plans for introducing 345 kv transmission on the Detroit Edison Co. system. The first portion of the proposed system will be built and insulated initially for 345 kv but will be operated at 120 kv until about 1964 when the first requirement for the higher voltage is anticipated. Double-circuit towers will be used to carry the maximum possible load on a single right-of-way. Main tower members will be high strength alloy steel and spans will average about 900 feet. Thermal capacity and radio influence considerations led to selection of twin-bundled 954 Mcm ACSR conductors.

A. C. Verock and R. G. Patrick outlined general design features for single-circuit 345 kv lines developed by Commonwealth Associates. Major features include the use of twin-bundled 795 or 954 Mcm ACSR conductors in a horizontal configuration with an 18-inch horizontal bundle spacing, 18-unit suspension insulator strings with the middle phase restrained in a "V" formed by two insulator strings to reduce tower arm length to 54 feet and a new waist-type narrow base tower weighing only 3.5 tons. Suitability of the new narrow base tower results from modification of the allowance for broken wire conditions based on the assumption that both conductors of the twin bundle will not be broken at the same time.

Overhead Construction Costs

A. E. Fehlenberg described improved controls for overhead construction costs and manhours developed by the Union Electric Company. This paper appears in this issue of the BULLETIN.

H. A. Heim reviewed Kansas City Power & Light Co. experience in converting metropolitan 4 kv distribution to 13.2 kv operation. This paper also appears in this issue of the BULLETIN.

Standards and Specifications

M. H. Powell, Chairman of the Standards and Specifications Subcommittee, called on task force chairmen for progress reports of their activities.

C. E. Topping reported that an approved revision of TD-4, "Specifications for Eye Bolts," is about ready to be released for printing. Proposed

new specifications for insulated clevises and expansion shields for galvanized lag screws and machine bolts are about ready to be submitted to members for ballot. Work on a number of other proposed new and revised line hardware specifications is continuing.

F. A. Ashbaugh reported favorable letter ballots on proposed new specifications for heavy duty Douglas fir crossarms and heavy duty Douglas fir braces and a proposed revision of TD-100, "Specifications for Full-Length, Non-Pressure Preservative Treatment of Poles." The Timber Products Task Force is continuing its studies of standing pole inspection practices and development of an industry standard for pole framing.

Underground Cable Task Force

F. C. Marschner stated that the Connectors for Underground Cable and Cable Accessories Task Force is making good progress in preparing a proposed new specification for straight compression type connectors for insulated copper conductors.

A report from F. E. Sanford outlined progress of the research program on aluminum conductor fittings being conducted by Armour Research Foundation. Two new series of tests now under way are concerned with corrosion and interstrand resistance.

A. T. Green reported that the EEI-NEMA Joint Committee on Standardization of Street Lighting Equipment has drafted a proposed new standard for multiple sockets and supports which is ready to be sent to members for ballot. Work on a number of proposed standards for other items is continuing.

H. N. Diller described a new method of installing pole mounted transformers devised by the Central Illinois Public Service Co. This scheme, applicable to installations below 5 kv, utilizes insulated primary risers carried in continuous polyethylene tubing supported clear of the pole.

Safety

The opening session of the second day of the meeting was sponsored by W. J. Witte, Chairman of the Safety Subcommittee.

G. V. Williamson, vice president, production and distribution, Union Electric Co., discussed safety from the management viewpoint. He emphasized that good safety performance and efficient operation generally are considered to be inseparable and a direct reflection of good management. Transmission and distribution work should be of special concern both because of the exposure involved and because it is the industry's showcase to the public.

W. A. Parker described underground system safety practices of the Oklahoma Gas and Electric Co., including methods of handling traffic hazards, gas in manholes, shoring, cable identification and phasing, and the use of rubber protective equipment. He also outlined other aspects of safety promotion including training, safety meetings, accident investigation and a scheme for submission of safety observation reports. Together these measures have been successful in achieving a long period of accident-free operation for the company.

W. K. Smith similarly described the safety practices and program of the underground construction forces of the Union Electric Co. He stressed the value of establishing construction standards and uniform work practices, detailed briefing of each job by the foreman before work is started and a regular program of safety meetings which promote participation by all employees. This program also has resulted in an excellent safety record.

Underground

The final session was sponsored by T. C. Duncan, Chairman of the Underground Subcommittee.

J. A. Pulsford announced that the new *Underground Systems Reference Book* will be available approximately Aug. 1.

A report from H. E. Cody outlined progress of the research project on soil thermal resistivity. This project according to Mr. Cody, is about half completed.

J. Bogdanowski described horizontal earth boring methods and equipment developed by the Consolidated Edison Co. for use where open trench methods are either uneconomical or impractical. Equipment now in use provides a range of bores from 1 to 30 inches in diameter and from 30 to 250 feet in length. Costs are greater than for open trench on normal city streets but less on congested streets and parkways. The over-all cost of boring operations during the past two years saved 11 per cent as compared with the open trench method.

D. C. Hawley conducted a symposium devoted to the underground. distribution systems in residential areas.

C. H. Elder described experimental buried telephone distribution systems installed by the Illinois Bell Telephone Co. in an effort to develop a lower cost underground service for residential areas. Principal features are the use of polyethylene insulated cable and a 3-inch trenching machine which has reduced trenching costs substantially. He also discussed physical coordination problems encountered in a recent installation in the Springdale Subdivision, Western Springs, Illinois, where both power and telephone systems were buried on opposite sides of 10-ft. rear lot line easements.

Buried Cable Systems

R. E. Smith discussed Commonwealth Edison Co. experience with buried cable systems in residential areas including the Springdale installation mentioned before. These feature looped primaries consisting of two-conductor rubber-insulated, neoprene-jacketed cable with concentric stranded neutral and line-type transformers in aboveground vaults placed so that four services can be run directly from each location without using secondaries. Performance has been satisfactory and preliminary data on maintenance costs are encouraging.

R. C. Blankenburg stated that the Southern California Edison Co. has installed underground service in a number of new subdivisions but uses duct systems exclusively in the belief that their higher first cost will be more than offset by lower maintenance and future cable replacement costs.

Colteryahn Reports

H. C. Colteryahn reported that Union Electric Co. experience with costly rebuilding of buried residential systems to increase capacity has led to a decision to use only duct systems.

A report from C. E. Baugh described Pacific Gas and Electric Co. experience with early failure of buried systems and favored the use of duct systems.

Hydraulic Power Committee Meeting

L. B. Card, *Chairman*

THE Hydraulic Power Committee met in Massena, N. Y., for its 1957 annual sessions. The meeting at Massena, on the Canadian border, provided an opportunity for the Committee to include in its program inspection tours of the Niagara Mohawk Power Corp.'s Raquette River Development and the giant construction program of the St. Lawrence River Power Project. The last day and a half of the three-day session on May 13-15 was devoted to these inspection trips. The 35 members and guests in attendance met at the Highland Hotel, a short bus trip from each of these interesting projects.

Round Table Emphasized

The planning of this meeting gave somewhat more emphasis to the round table discussion period than had previous meetings. This important activity, conducted by E. S. Harrison, Vice Chairman, was the first item of the Monday morning agenda and most of that morning was occupied with the round table consideration of 16 topics. They included experience with the use of needle beams, the repair and prevention of cavitation in runners and buckets of hydraulic turbines, the protection of storage tanks against freezing, the reduction of hydraulic turbine vibration by air injection, and others. The increasing interest in round table discussion follows trends reported by other EEI Engineering Committees.

Another feature of the Monday morning session was a report by E. B. Strowger on the 1956 Schoellkopf Hydro-Electric Plant disaster. Mr. Strowger's discussion was illustrated by a number of slides.

During the afternoon of the first day the Committee's three subcommittees reported on their activities. The first of these reports was presented by K. O. Strenge, Jr., Chairman of the Weather Modification Subcommittee. He pointed out that an interesting development in the field of meteorology is the increasing use of electronic computers. The report summarized weather modification activities of the past year and included reviews of a number of significant papers on this subject.

Larned Presents Summary

In the absence of the Pressure Regulation Subcommittee's Chairman, T. J. Corwin, A. T. Larned presented a summary of information compiled to date in the Subcommittee's investigation of pressure regulation. The Subcommittee will continue this activity.

G. J. Vencill, Chairman of the Vibration in Hydraulic Units Subcommittee, reported that since the 1956 meeting of the Committee the Subcommittee has combined its activities with the National Electrical Manufacturers Association which has resulted in the formation of a Joint Committee. The Joint Committee plans to meet within the next few weeks for the purpose of planning a program. The last year has been spent largely in the organization of the present group.

Following the subcommittee reports of the Monday afternoon session, T. C. Stavert described how the Southern California Edison Co. procures and trains unskilled manpower for hydro-plant operation. Although the general labor market has been extremely tight in the Pacific Coast area, Mr. Stavert's company has found it possible through well planned selection procedures to develop capable station operating personnel from available unskilled manpower.

Welded Steel Flow Line

The Tuesday morning session continued with presentation of papers by Committee members and guests. R. Van Vliet discussed the construction of a welded steel flow line 8,500 feet long and 14 feet 8 inches in diameter for the Pennsylvania Power & Light Co. at Lake Wallenpaupack in Pennsylvania. This line was constructed to replace a wood-stave pipe line that was built thirty years ago. Mr. Van Vliet illustrated his presentation with a number of slides.

In addition to planning an inspection trip for the Committee of the Raquette River Development, E. B. Strowger presented a paper describing the engineering features of this development. Until 1954 the Niagara Mohawk Power Corp. owned and operated nine hydroelectric plants on the Raquette River. The company has now gone upstream to complete the development of the river by means of a construction program that added a five billion cubic foot storage reservoir for regulating the river and will add five new generating stations on the line by this coming fall. The addition in capacity will be 100,000 kw.

The final paper of the meeting was prepared and presented by E. L. Armstrong, Assistant Project Manager, Uhl, Hall & Rich for the St. Lawrence Power Project. On arrangements by B. O. McCoy, Mr. Armstrong attended the session as a guest to describe the St. Lawrence Power Development and to conduct the Committee on its tour of the project on the following day.

Armstrong Speaks on Dams

Mr. Armstrong discussed in detail the construction of the St. Lawrence Power Dam, the Long Sault Dam, the Massena Intake Structure, the Iroquois Dam, the Reservoir Channel Excavation, and the general features of the vast St. Lawrence program.

The over-all project will require the excavation of 150 million cubic yards of earth and rock and the placing of five million cubic yards of concrete and nearly 200,000 tons of steel. To complete this project in the allocated time has resulted in one of the largest arrays of construction equipment of all time with approximately 80 million dollars of construction equipment presently being employed in the International Rapids Project area which includes both the power and the seaway work.

The Tuesday afternoon inspection trip to the Raquette River Project included visits to the Carry Falls Reservoir and the Stark, Blake Falls, Rainbow Falls, High Falls and South Colton Power Plants of the Niagara Mohawk Power Corp. The field trip of the following day to the St. Lawrence Power Project included a complete inspection of the program area and projects.

Electrical System & Equipment Committee Meeting

H. E. Deardorff, *Chairman*

THE Electrical System and Equipment Committee held its 72nd meeting at the Hotel Statler in Buffalo, N. Y., May 20-21 with an attendance of approximately 100 members and guests.

The program consisted of an inspection trip to the Sir Adam Beck hydroelectric station at Niagara Falls on Sunday afternoon and presentation of papers, reports and discussions under the sponsorship of D. W. Taylor, Chairman of the Subcommittee on System and Equipment Troubles; R. M. Pennypacker, Chairman of the Subcommittee on Equipment and Station Operation and Maintenance; J. W. Bennett, Chairman of the Subcommittee on Equipment and Station Design; and R. G. Meyerand, Chairman of the Subcommittee on System Engineering.

Since the regular Chairman, H. E. Deardorff, was unable to be present, J. H. Foote of Commonwealth Associates acted as Chairman for the activities on Sunday; D. W. Taylor, of the Public Service Electric and Gas Co., acted as Chairmen for the two-day business session; and R. G. Meyerand, of Union Electric Co., conducted the round table discussion.

On Monday morning in closed session the program of the Subcommittee on System and Equipment Troubles was presented. Various system disturbances and apparatus failures were informally discussed.

On Monday afternoon, following the established practice, a round table discussion of subjects of general interest which had previously been submitted by members was held. Mr. Meyerand acted as moderator.

On Tuesday morning a symposium on transformer noise was conducted under the auspices of the Subcommittee on Equipment and Station Design. J. W. Bennett was moderator, and the panel consisted of C. C. Honey of the Pennsylvania Transformer Co.; W. M. Terry of Allis-Chalmers Manufacturing Co.; M. E. Fagan of Westinghouse Electric Corp.; and J. R. Meador of General Electric Co.

The panel discussed the theoretical and practical aspects of the transformer noise problem and the steps being taken by their individual companies to make consistently quiet transformers available at little or no increase in cost or physical dimensions. The committee indicated that they hoped future basic research would be devoted to designing transformers having an inherent low noise level rather than trying to add auxiliary equipment to decrease the noise level; the latter measures were considered as interim solutions to the basic problem.

Piasecki, VanDyke Talk

H. A. Piasecki and W. C. VanDyke of Niagara Mohawk Power Corp. described the addition of two 200 megawatt units to the C. R. Huntley Steam Station at Buffalo. These new units are located in the space formerly occupied by four old stoker-fired boilers and their associated generating equipment. The new units are of cross-compound unit design having one 3600 rpm and one 1800 rpm single flow turbine and two 100 mw generators.

A report on the recent activities of ASA C-76 on bushing standardization was presented by J. H. Vivian in which he informed the group that a letter ballot on dimensional standards for high voltage bushings had been sent out. He pointed out that the electrical characteristics had been rather well standardized, the present ballot was primarily concerned with dimensional standardization and the ASA C-76 Committee would next endeavor to prepare suitable mechanical standards.

The program of the Subcommittee on Equipment and Station Operation and Maintenance centered around air and disconnect switches. Oscar Bauhan and N. A. Bleshman of the Public Service Electric and Gas Co. presented an illustrated paper showing the results of tests made on disconnect switches removed from service. These tests indicated that although many of the disconnecting switches tested were over 30 years old their short circuit capacities compare favorably to many switches purchased today and it should not be assumed that the outward appearance of disconnecting switches and the number of years they have been in service are adequate criteria for judging short circuit capacity, provided the switches have been properly maintained.

V. J. Hayes of the System Engineering and Operation Subcommittee sponsored a paper presented by E. C. Brown of The Hartford Electric Light Co. entitled "Connecticut's Plan for Coordinating Capacity Addition." The four larger electric utilities in Connecticut are following a plan for jointly developing their bulk power supply. Each of these companies is a separate corporate entity, conscious of its independence, yet searching for high economy. The plan provides a basis whereby these independent companies will jointly benefit from the economics of generating units of larger sizes than could be justified on an individual system basis. Mr. Brown pointed out that the first participation unit is not yet in actual operation, so there was no operating experience available. However, he felt that a broad basic plan has been developed for cooperation and coordination that affords small utilities the major bulk system economies of larger companies without sacrifice of their independence. Discussion showed similar plans were used in other sections of the country in order to achieve greater economy and provide better service.

The second paper on the program of the Subcommittee on System Engineering and Operation was sponsored by G. M. Tatum and presented by Harrison Hubbard of the Virginia Electric and Power Co.

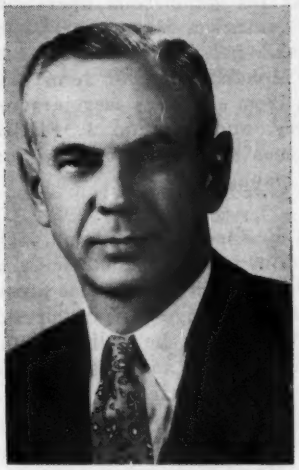
Mr. Hubbard described the method used for automatic control of generation on this system which has both steam and hydro generating units. The control makes it possible to keep each station at the same incremental rate and thus produce the most efficient generation. The generating and water storage capacity of the two large hydro stations are used primarily for peaking purposes, whereas the steam stations are used for base load. The control console will automatically change the governors for normal load variations in accordance with the setting.

Personals

L. A. Nichols, vice president and general manager of Superior (Wis.) Water, Light and Power Co., was elected president of the company, succeeding **H. J. Underhill** who has resigned but who will continue as a board member and as a consultant to the company. Mr. Nichols joined the company in 1935 as a sales engineer. In 1942 he was appointed general sales manager. He returned to Superior in 1945 after three years with the U. S. Navy as a lieutenant commander. He attended Superior State College and was graduated from George Washington University in 1930 with a degree in business administration. He was vice president and general manager for the past 12 months. Mr. Underhill has been in the utility business more than half a century. He came to Superior in 1935 as vice president and general manager. He was named president of the company in 1941.

In recent executive appointments, Mississippi Valley Public Service Co. elected **E. H. Finkelnburg** board chairman, **S. J. Petterson** president-general manager and **N. J. Fischer** vice president-operations. Mr. Finkelnburg has been with MVPS since 1918, advancing from his first post as electrical engineer to become vice president and general manager in 1943. Mr. Petterson, executive vice president for six years, started with the utility in 1928 as a storekeeper. He was named treasurer and assistant secretary in 1938 and in 1948 became vice president, treasurer and a director. Mr. Fischer has been with MVPS 10 years, starting as electrical engineer. He has been assistant general manager since 1953.

James F. Crist, vice president of The Southern Co., was recently elected president of Southern Electric Generating Co., owned equally by Alabama and Georgia Power Co.'s. The company was formed to build and operate large new power facilities. Each of these companies will receive half of the power output. Mr. Crist succeeds **Herbert J. Scholz,** chairman of the board of Southern Services, Inc., who has retired from active service but who will continue as an independent consultant for the company. Mr. Crist has been vice president of The Southern Co. since 1947. A graduate of Virginia Military Institute and Massachusetts Institute of Technology, he was a vice president of South Carolina Power Co. from 1941 to 1947. From 1926 to 1928 he was with Alabama Power Co. Mr. Scholz joined Alabama Power Co. in 1921 and has been associated with that company and other members of The Southern Co. for 36 years.



L. A. NICHOLS

Otto W. Manz, Jr., has been elected executive vice president and **C. Wesley Meytrott,** vice president of sales, Consolidated Edison Co. of New York, Inc. The election of Mr. Manz re-establishes the post of executive vice president which was abolished in 1955. Mr. Meytrott, assistant vice president since 1953, succeeds Mr. Manz. Mr. Manz joined Brooklyn Edison, a Con Edison predecessor, in 1925 as an engineering assistant and became a division engineer of that company in 1941. During World War II he was on loan to Union Carbide and Carbon Corp. to assist in the construction of an electric generating station for the atomic installation at Oak Ridge, Tenn. Returning to Con Edison in 1946, he was named manager of system operation in 1950. He has been vice president since 1954. Mr. Manz received a degree in electrical engineering from the University of Pennsylvania in 1923. Mr. Meytrott has been associated with the utility's sales activities since 1933. He received his degree in electrical engineering from Massachusetts Institute of Technology in 1927. He joined New York Edison, also a Con Edison predecessor, 34 years ago as a commercial engineer.

Axel H. Herbert, assistant to the general manager of Minnesota Power & Light Co., recently was named vice president and assistant general manager of the utility. With the company since 1926, Mr. Herbert has had wide experience in MP&L's administrative, sales and operating departments. In 1936 he became Long Prairie district superintendent and in 1944 was promoted to Little Falls division manager. He held this position until 1954.

J. F. Estill, Jr, purchasing agent for Houston Lighting & Power Co., was recently elected vice president of the utility. He joined HL&P in 1927 as a budget engineer. He obtained his degree in electrical engineering from Texas A & M College in 1925 and was graduated from Houston Law School in 1929.

Election of **S. N. Fiala** as vice president and chief engineer has been announced by American Gas & Electric Service Corp. He had served as chief engineer of AGE for three years. Mr. Fiala has been associated with the company since 1934 and has served in various capacities in the engineering department. He received his mechanical engineering degree from Stevens Institute of Technology.

Charles E. Strickland, vice president of Kansas Power & Light Co., has been elected vice president of Interstate Power Co. He will be district manager of the Mason City, Iowa, area. A banker for many years, he entered the utility business as vice president of United Light & Power Co., Chicago. Six years later he joined KP&L.

Andrew J. Haswell, director of personnel administration for Oklahoma Gas & Electric Co. since 1946, has been named a vice president of the company. Mr. Haswell was a part-time mail boy for the utility

while attending high school and Oklahoma University and has been a full-time employee since 1929. He served as Western Division accountant and assistant auditor. Under Mr. Haswell's leadership OG&E developed a training and safety program which led to the utility's third place rank in safety among all utilities of its size.

Robert H. Engels, assistant to the president of Northern States Power Co., was recently elected a vice president of the company. Mr. Engels, has devoted most of his 31-year NSP career to the sales field. Starting in 1926 as a merchandise salesman, he rose to sales manager of the Galena Division in 1934 and transferred to the general office municipal sales department in 1948. He was appointed Sioux Falls Division manager in 1952.

Advancement of two vice presidents and election of four other vice presidents has been announced by Niagara Mohawk Power Corp. **R. H. Stratton,** v.p., commercial operations since 1953, becomes administrative v.p., and **Frank T. McEvoy,** commercial v.p., Eastern division, becomes v.p.-commercial operations.

Storrs M. Bishop, secretary, is commercial v.p.; **Frank M. Osta,** director of employee relations, is v.p. of employee relations; **Arthur W. Evans,** administrative assistant, is v.p. in charge of industrial development, stockholder and investor relations; **A. Floyd Wray,** manager of commercial operations for the Central division, is v.p.

Mr. Stratton will be chief executive of the Eastern division. During his 31 years with the system, he has been lighting and power sales engineer, district manager and executive assistant to vice president-commercial activities. Mr. McEvoy was commercial v.p. of the Eastern division since 1950. He will direct system commercial, publicity and advertising operations. He joined the company in 1915 and has been traffic manager, purchasing agent and resident district manager. Mr. Bishop will be in charge of commercial operations in the Eastern division. He has been with the utility 31 years. Mr. Osta has been with the company 24 years. In addition to being director of employee relations, he has also been attorney and associate counsel for the company. Mr. Evans has been administrative assistant since 1954. Mr. Wray will have responsibility for commercial operations in the Central division.

Other personnel changes at Niagara Mohawk include: **John G. Benack,** from assistant secretary to secretary, and **Edmund J. FitzGerald** becomes assistant secretary and office manager.

C. R. Stockhus, director of labor relations for Union Electric Co. since 1954, has been elected vice president of the company. As vice president-labor relations he will continue to conduct labor negotiations, administer labor contracts and general relationships between the company and unions representing the employees. Mr. Stockhus has been associated with Union Electric since 1931, immediately following his graduation from Washington University with a degree in electrical engineering. In 1946 he was appointed senior personnel man of the company. He became supervisor of the employee relations and planning division also that year.

P. M. Rutherford, Jr., commercial manager and head of the commercial department for Dallas Power & Light Co., recently was elected vice president and commercial manager of the company. An electrical engineering graduate of the University of North Carolina, he has been associated with Dallas Power and Light since 1934. After serving as lighting director for seven years, he was named assistant sales manager in 1941 and was named to his most recent position in 1953.

Robert F. Scott, Louisiana division manager of the Southwestern Gas and Electric Co., has been elected vice president of the utility. Mr. Scott served as manager of the Louisiana new business department from 1937 and as assistant division manager from 1946 until 1956 when he became division manager. A native of Old Town, Maine, he was associated with Stone and Webster, Inc., before joining Southwestern.

T. D. Thomas, chief engineer for Texas Power & Light Co., has been elected vice president of the utility. He joined TP&L's utility appraisal section in 1920 immediately after earning his mechanical engineering degree from Rice Institute. In 1932 he was placed in charge of the engineering department's design section and was named chief engineer in 1939.

R. D. Furber, director of public information and advertising for Northern States Power Co., was recently elected president of the Public Utilities Advertising Association. Mr. Furber has been with NSP more than 25 years, starting in the sales department when he was graduated from the University of Minnesota with an electrical engineering degree. He has been an officer of PUAA for several years and has also served on the organization's board of directors.

J. C. Dale, president and general manager of Canadian Utilities Ltd., Edmonton, was elected president of the Canadian Electrical Association, Inc. at the organization's recent 67th Annual Convention. Other officers elected are: vice presidents, **N. T. Smith,** general manager of the Nova Scotia Light & Power So., Halifax; **N. S. Crerar,** president of Saguenay Power Co., Arvida; and **J. H. Steede,** chief electrical engineer of British Columbia Electric Co., Ltd., Vancouver; managing director and secretary, **B. C. Fairchild,** Canadian Electrical Association, Montreal; treasurer, **Wilfrid Booth,** Shawinigan Water and Power Co., Montreal.

George F. Mackenzie, a veteran of more than 40 years with the Pacific Power & Light Co., has been elected vice president and treasurer of the Portland, Ore. utility. Mr. Mackenzie has been treasurer since 1950.

Ralph M. Besse, executive vice president of The Cleveland Electric Illuminating Co., received the honorary degree of doctor of letters (LHD) at Heidelberg College, Tiffin, Ohio, at graduation ceremonies there June 9.

George N. Hawley, vice president of Southern California Edison Co., was elected president of the Pacific Coast Electrical Association at the recent 40th annual convention of the association in San Francisco. Mr. Hawley succeeds **Walter J. Maytham,** Pacific Coast vice president of Westinghouse Electric Corp.

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

OFFICERS

D. S. KENNEDY, *President* ..... Oklahoma Gas and Electric Co., Oklahoma City, Okla.
J. W. MCAFEE, *Vice President* ..... Union Electric Co., St. Louis, Mo.
EDWIN VENNARD, *Vice President and Managing Director* ..... 420 Lexington Ave., New York, N. Y.
H. S. SUTTON, *Treasurer* ..... Consolidated Edison Co. of New York, Inc., New York, N. Y.
A. B. MORGAN, *Secretary and Assistant Managing Director* ..... 420 Lexington Ave., New York, N. Y.

BOARD OF DIRECTORS

(*Terms expiring 1958*)

J. L. BATES ..... Central Power and Light Co., Corpus Christi, Texas
A. M. BEEBEE ..... Rochester Gas and Electric Corp., Rochester, N. Y.
F. D. CAMPBELL ..... Cambridge Electric Light Co., Cambridge, Mass.
C. B. DELAFIELD ..... Consolidated Edison Co. of New York, Inc., New York, N. Y.
R. ROY DUNN ..... Potomac Electric Power Co., Washington, D. C.
R. H. GERDES ..... Pacific Gas and Electric Co., San Francisco, Calif.
N. B. GUSSETT ..... Iowa Power and Light Co., Des Moines, Iowa
E. L. LINDSETH ..... The Cleveland Electric Illuminating Co., Cleveland, Ohio
D. C. LUCE ..... Public Service Electric and Gas Co., Newark, N. J.
M. S. LUTHRINGER ..... Central Illinois Public Service Co., Springfield, Ill.
C. E. OAKES ..... Pennsylvania Power & Light Co., Allentown, Pa.
H. T. PRITCHARD ..... Indianapolis Power & Light Co., Indianapolis, Ind.
K. M. ROBINSON ..... The Washington Water Power Co., Spokane, Wash.
L. M. SMITH ..... Alabama Power Co., Birmingham, Ala.
HAROLD TURNER ..... American Gas and Electric Service Corp., New York, N. Y.

(*Terms expiring 1959*)

H. J. CADWELL ..... Western Massachusetts Electric Co., Greenfield, Mass.
STUART COOPER ..... Delaware Power & Light Co., Wilmington, Del.
CARL J. FORSBERG ..... Wisconsin Power and Light Co., Madison, Wis.
ALLEN S. KING ..... Northern States Power Co., Minneapolis, Minn.
C. E. KOHLHEPP ..... Jersey Central Power & Light Co., Asbury Park, N. J.
C. R. LANDRIGAN ..... The Detroit Edison Co., Detroit, Mich.
J. E. LOISEAU ..... Public Service Co. of Colorado, Denver, Colo.
EARLE J. MACHOLD ..... Niagara Mohawk Power Corp., Syracuse, N. Y.
D. C. MCKEE ..... The Empire District Electric Co., Joplin, Mo.
P. H. POWERS ..... West Penn Power Co., Greensburg, Pa.
R. G. RINCLIFFE ..... Philadelphia Electric Co., Philadelphia, Pa.
R. E. RITCHIE ..... Arkansas Power & Light Co., Little Rock, Ark.
W. H. SAMMIS ..... Ohio Edison Co., Akron, Ohio
J. R. WELSH ..... Southwestern Gas and Electric Co., Shreveport, La.
ERWIN H. WILL ..... Virginia Electric and Power Co., Richmond, Va.

(*Terms expiring 1960*)

W. C. BECKJORD ..... The Cincinnati Gas & Electric Co., Cincinnati, Ohio
W. C. BELL ..... The United Illuminating Co., New Haven, Conn.
N. A. COCKE ..... Duke Power Co., Charlotte, N. C.
J. F. DAVENPORT ..... Southern California Edison Co., Los Angeles, Calif.
T. W. DELZELL ..... Portland General Electric Co., Portland, Ore.
G. S. DINWIDDIE ..... New Orleans Public Service Inc., New Orleans, La.
WILLIS GALE ..... Commonwealth Edison Co., Chicago, Ill.
M. L. KAPP ..... Interstate Power Co., Dubuque, Iowa
W. T. LUCKING ..... Arizona Public Service Co., Phoenix, Ariz.
W. W. LYNCH ..... Texas Power & Light Co., Dallas, Texas
L. C. MCCLURKIN ..... Savannah Electric and Power Co., Savannah, Ga.
J. J. MCDONOUGH ..... Georgia Power Co., Atlanta, Ga.
A. R. SCHILLER ..... Public Service Co. of New Hampshire, Manchester, N. H.
G. W. VAN DERZEE ..... Wisconsin Electric Power Co., Milwaukee, Wis.
J. THEODORE WOLFE ..... Baltimore Gas and Electric Co., Baltimore, Md.

Executive Committee

C. B. Delafield, R. R. Dunn, A. S. King, E. L. Lindseth, C. E. Oakes, R. G. Rincliffe
K. M. Robinson, W. H. Sammis, G. W. Van Derzee

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

ADVISORY COMMITTEE 1957-1958

D. C. Barnes.....Virginia Electric and Power Co.
A. D. Barney.....The Hartford Electric Light Co.
J. B. Black.....Pacific Gas and Electric Co.
W. L. Cisler.....The Detroit Edison Co.
C. P. Crane.....Baltimore Gas and Electric Co.
T. G. Dignan.....Boston Edison Co.
Edgar H. Dixon.....Middle South Utilities, Inc.
Philip A. Fleger.....Duquesne Light Co.
George M. Gadsby.....Utah Power & Light Co.
D. E. Karn.....Consumers Power Co.
George L. MacGregor.....Texas Utilities Co.
Lyle McDonald....Public Service Electric and Gas Co.
Paul B. McKee.....Pacific Power & Light Co.
I. L. Moore.....New England Electric System
W. C. Mullendore.....Southern California Edison Co.
Grover C. Neff.....Wisconsin Power and Light Co.
J. S. Osborne.....Central & South West Corp.
Philip Sporn.....American Gas and Electric Co.
L. V. Sutton.....Carolina Power & Light Co.
Frank M. Tait.....The Dayton Power and Light Co.
J. B. Thomas.....Texas Electric Service Co.
E. S. Thompson.....The West Penn Electric Co. (Inc.)
Allen Van Wyck.....Illinois Power Co.
E. A. Yates.....The Southern Co., Inc.

CHAIRMEN OF EDISON ELECTRIC INSTITUTE COMMITTEES (1956-1957)

ACCOUNTING

Accounting Division Executive, R. G. Schneider.....Virginia Electric and Power Co., Richmond, Va.
Coordinator of Customer Activities Group, B. J. McMillen.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
Customer Accounting, A. B. Wilson.....Georgia Power Co., Atlanta, Ga.
Customer Collections, W. E. Travis.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Customer Relations, J. W. Kehoe.....Commonwealth Edison Co., Chicago, Ill.
Coordinator of General Activities Group, A. P. Thompson.....Iowa Power and Light Co., Des Moines, Iowa
Depreciation Accounting, P. K. Read.....New York State Electric & Gas Corp., Ithaca, N. Y.
General Accounting, A. T. Emmons.....West Penn Power Co., Greensburg, Pa.
Internal Auditing, R. E. Tate.....Kansas Gas and Electric Co., Wichita, Kans.
Plant Accounting and Property Records, A. C. Herron.....Florida Power Corp., St. Petersburg, Fla.
Taxation Accounting, R. J. Van Ess.....Consumers Power Co., Jackson, Mich.
Coordinator of Special Activities Group, J. D. Elliott.....The Detroit Edison Co., Detroit, Mich.
Accounting Developments Service, A. H. Kern.....Alabama Power Co., Birmingham, Ala.
Accounting Employee Relations, J. F. McCahon.....Philadelphia Electric Co., Philadelphia, Pa.
Application of Accounting Principles, R. R. Fortune.....Pennsylvania Power & Light Co., Allentown, Pa.
Electronic Accounting Machine Development, Russell Britt.....Wisconsin Electric Power Co., Milwaukee, Wis.
Uniform System of Accounts, P. R. Lawson.....Pennsylvania Electric Co., Johnstown, Pa.

COMMERCIAL

Commercial Division Executive, T. O. McQuiston.....Metropolitan Edison Co., Reading, Pa.
Commercial Sales Group, R. I. Bull.....Ohio Power Co., Canton, Ohio
Farm Group, M. O. Whithed.....Atlantic City Electric Co., Atlantic City, N. J.
Industrial Power & Heating Group, F. E. Wiatt.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
Residential Group, Robert L. Coe.....Union Electric Co., St. Louis, Mo.
Special Services Group, B. L. Palm.....Central Illinois Public Service Co., Springfield, Ill.

ENGINEERING

Engineering & Operating Division Executive, C. W. Franklin...Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Electrical System & Equipment, H. E. Deardorff.....The Dayton Power and Light Co., Dayton, Ohio
Hydraulic Power, L. B. Card.....Public Service Co. of Colorado, Denver, Colo.
Meter & Service, G. J. Yanda.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Prime Movers, J. M. Driscoll.....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Transmission & Distribution, G. H. Fiedler.....Rochester Gas and Electric Corp., Rochester, N. Y.

GENERAL

General Division Executive, J. W. McAfee.....Union Electric Co., St. Louis, Mo.
Accident Prevention, R. W. White.....Pacific Gas and Electric Co., San Francisco, Calif.
Area Development, J. R. Frederick.....Wisconsin Power & Light Co., Madison, Wis.
Atomic Power, E. H. Dixon.....Middle South Utilities Inc., New York, N. Y.
Awards, G. W. Ousler.....Duquesne Light Co., Pittsburgh, Pa.
Electric Power Survey, A. S. Griswold.....The Detroit Edison Co., Detroit, Mich.
Financing & Investor Relations, W. J. Rose.....American Gas and Electric Co., New York, N. Y.
Industrial Relations, J. C. Arnell.....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Insurance, R. D. Constable.....Niagara Mohawk Power Corp., Syracuse, N. Y.
Legal, J. M. Keegan.....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
Membership, E. S. Thompson.....The West Penn Electric Co. (Inc.), New York, N. Y.
Purchasing & Stores, E. N. Scott.....Long Island Lighting Co., Hicksville, N. Y.
Rate Research, L. W. Frank.....Western Massachusetts Electric Co., Springfield, Mass.
Regulation, J. E. Corette.....The Montana Power Co., Butte, Mont.
Research Projects, E. H. Snyder.....Public Service Electric and Gas Co., Newark, N. J.
Statistical, F. A. Keane.....Public Service Electric and Gas Co., Newark, N. J.
Tax Policy, C. B. McManus.....The Southern Co., Inc., Atlanta, Ga.
Technical Assistance for Overseas Visitors, Harvey Bumgardner.....The Detroit Edison Co., Detroit, Mich.
Transportation, R. E. Hamel.....The Cleveland Electric Illuminating Co., Cleveland, Ohio